Telephony.

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THE FIRE RATES ISSUE BETWEEN INSURANCE AND TELEPHONE MEN

The suggestion that the presence of a telephone in a house should reduce the fire insurance rate has been submitted to fire underwriters' associations and has been turned down.

In its November 28, 1931, issue TELEPHONY commented on this question and stated the belief of telephone men that owners of a telephone are as much entitled to an insurance rate reduction as are the property owners having other fire protection.

Buildings equipped with fire fighting appliances enjoy reduced rates. Why do not the insurance companies accord the same advantage to building owners with a telephone on the premises that will minimize property damage from fire?

This question has been put up directly to the insurance organizations, with special stress placed on the protection against fire which the telephone gives the isolated farmer, but so far with only negative results.

* * * *

Telephone interests have been in correspondence with the underwriters' bureaus in both Chicago and New York. Writing from New York, the Eastern Underwriters' Association says in the course of a letter on the subject:

"A cold-blooded analysis of the situation, however, does not lead the insurance interests as represented in this office to look with favor upon a rate reduction for the possibility of alarms being sent in over the telephone.

As regards farms, as a whole they are so located that protection, even though notified, arrives too late to be of much service. Many specific exceptions to this broad statement could, of course, be presented, but our general conclusion is correct.

As regards city property, it is a fact that many alarms do come in over the telephone, but other facilities are provided which would be used if the telephone were not present."

* * * *

The Western Actuarial Bureau, the fire underwriters' headquarters at Chicago, recognizes that the telephone is a universal necessity, but raises the point that insurance companies handling rural risks have found the business unprofitable and could not afford to grant a rate lower than now prevails.

It is further contended that if rural telephones obtained an insurance concession. the same reduction would have to be accorded to city telephones, although property in cities have much more fire protection than farm property.

Anyway, the letter from the Chicago underwriters concludes: "The proposal, in our opinion, does not warrant recognition by way of a credit in rate."

* * * *

While admitting that rural fire risks may have been unprofitable to the insurance companies, it is considered unfortunate that they cannot see their way clear to recognize in some substantial manner the fire protection which the telephone companies offer farm communities. They forget that their farm business would be even more unprofitable were it not for the telephone. The records are full of instances in which the presence of a telephone has prevented disastrous fire damage, not to mention the saving of life.

Many telephone companies include in their directories instructions to both employes and subscribers in case of fire, while telephone operators frequently are called upon to render a service in such emergencies that means no income to their companies. Apparently the telephone workers have not regarded the matter in the same "cold-blooded" way, in which the Eastern Underwriters' Association admits it has analyzed the telephone men's request for a fire rate differential.

* * * *

The refusal of the fire insurance bureaus to do anything about the matter has aroused resentment in telephone circles. Just how one large telephone company, with many farm stations, feels on the subject is shown in a letter, part of which says:

"You will note that the insurance companies take the very smug position that it would be a wonderful selling agent for the telephone companies if a credit were allowed in the premium for telephone service, but pat themselves on the back when

they state that the telephone is so universally necessary that they cannot allow a credit.

This, in effect, has been the attitude of the insurance companies throughout the history of the telephone, and I think they must be awakened to the fact that the telephone companies have for years done everything in their power to help the insurance game without receiving any corresponding cooperation on the part of the insurance interests.

I venture to say that somewhere every telephone company in existence displays information on how to make calls to give an alarm of fire. All of this tends to make a saving for insurance companies on their losses.

I believe that one way to jar the insurance companies out of their arbitrary position would be for all telephone companies in the United States to issue orders that directory information regarding fires be discontinued, and that no employe be permitted to cooperate in any way with the placing of a fire call. I feel quite sure that if the insurance companies once had this thought driven home to them they would be more apt to play ball."

* * * *

Of course, this is too drastic a reprisal. Telephone companies must consider their duty to their subscribers before "getting back" at the insurance corporations. The tone of the letter, however, shows how some telephone operating men feel. They believe telephone service — especially in rural sections—is just as much entitled to a differential in fire rates as are other protective devices, and there is good ground for the claim.

COMING CONVENTIONS.

Oklahoma Utilities Association, New Hotel Tulsa, Tulsa, March 8 and 9.

Texas Independent Telephone Association, Texas Hotel, Fort Worth, March 22, 23 and 24.

South Dakota Telephone Association, Hotel Cataract, Sioux Falls, April 6-7.

Ohio Independent Telephone Association, Deshler-Wallick Hotel, Columbus, April 13 and 14.

Kansas Telephone Association, Jayhawk Hotel, Topeka, April 19, 20 and 21.

Wisconsin State Telephone Association, Loraine Hotel, Madison, April 26, 27 and 28.

United States Independent Telephone Association, Southern District, Bristol, Tenn., May 4, 5 and 6.

Indiana Telephone Association, Claypool Hotel, Indianapolis, May 10 and 11.

Pennsylvania State Telephone & Traffic Association, Penn-Harris Hotel, Harrisburg, May 17, 18 and 19.

Up-State Telephone Association of New York, Jamestown Hotel, Jamestown, May 25, 26 and 27.

That the matter has not been dropped is shown by the action of the Nebraska Telephone Association at its recent convention, when the directors instructed Secretary George M. Kloidy to submit to the insurance companies a proposition made by R. E. Dutcher, of the Pierce Telephone Co.

This proposal, in brief, was that in towns where the telephone exchange sets off fire alarms, or operates a siren, those having telephones be granted a lower insurance rate than others who are without service. The discussion developed a strong belief that such protection is entitled to some substantial recognition from insurance companies.

The idea that the granting of such a differential would make a good sales argument for getting telephone subscribers was also stressed, but it was contended that this should not stand in the way of the insurance interests dealing fairly with telephone companies.

* * * *

The insurance rate question is also being agitated in the advertising carried by telephone companies in their local papers. The Greenville (Ala.) Telephone Exchange advertises in the Greenville Advocate's February 19 issue:

"Protecting your home! Do you know that fire calls are received almost entirely by telephone? Do you know that your fire insurance company is vitally interested in your having a telephone in your home, and should consider the telephone in making your rate?"

In its editorial column, the Advocate prints an article which says that the best fire protection is a telephone. The editorial praises the telephone company's vigilance in giving fire alarms, and concludes with this sentence:

"The telephone is our greatest fire preventive, and insurance companies should take cognizance of it in fixing rates."

* * * *

At Danville, Ill., the city commission has adopted a resolution instructing the corporation counsel to draw up an ordinance "requesting" the telephone company to install a system for sending in fire calls. If city authorities value the telephone so highly as a fire protection, they might also "request" the insurance companies to help pay for this service by adjusting their rates for telephone users to some extent.

Time Factor in Telephone Transmission

Effects of Delay in Transmission Over Long Electrical Circuits—Distortion Because of Variation in Rate of Travel of High and Low Frequencies Shown; Echo Effects—Published Through the Courtesy of Bell Laboratories Record

By O. B. Blackwell,
American Telephone & Telegraph Co., New York, N. Y.

Until comparatively recent years the telephone engineer could assume for all practical purposes that speech was transmitted instantly between the ends of telephone circuits; and he needed to give little attention in his problems to the time of transmission.

The rapid extension of the range of commercial telephony and the use of long telephone cables have changed the situation and emphasized problems of time in telephone transmission, which are of large technical interest and difficulty. Speed and time of transmission, as a result, are receiving more consideration—a fact readily verified by a glance at the papers on transmission published in recent years.

Time enters telephone problems because the speed of transmission of electrical impulses has a finite value. Whenever a change in applied voltage is made at one end of a circuit, some evidence of the change is transmitted to the receiving end at the speed of light. Except in radio, however, no sufficient action is ordinarily transmitted at this speed to be of use, and speed so defined is of theoretical interest.

The speed that the engineer generally has in mind while considering electrical transmission is that at which the crests and troughs of the waves pass along a line when a single-frequency potential is continuously applied at the sending end. This is usually referred to as the "speed of phase transmission in the steady state."

In the transmission of intelligence, however, the potential is not a steady single frequency, but varies in accordance with the signal being transmitted, as is illustrated by the sending of a dot over a carrier telegraph channel.

In that case a voltage of a single frequency is applied to the circuit for a short interval and then removed; with the result that a spurt of energy travels along the line. The speed with which it travels is the speed which is of importance to the transmission engineer, whether concerned with telegraphic or telephonic signals.

Since speed of transmission is usually not the same for all frequencies; the narrow range of frequencies to which it applies must always be specified. It is then defined approximately as the speed with which a dot impulse travels when caused by the application of a voltage of frequency corresponding to the mid point of the frequency range.

Type of Circuit	Approx. Speed in Miles per Second
Cable circuits loaded with 88-mh. coils at 3,000-foot spacing	10,000
Cable circuits loaded with 44-mh. coils at 6,000-foot spacing	20,000
Cable pairs of non-loaded 16 B. & S. gauge	130,000
Non-loaded open-wire pairs	180,000
Radio	186,000

Fig. 1. Typical Transmission Speeds for Various Types of Circuit.

Speed so defined will differ considerably for different types of circuits. It is the same as the speed of light in the case of radio and also for the ideal and limiting case of a pair of open wires of zero resistance in free space, separated from all other conductors, and without leakage.

Actual non-loaded open-wire circuits, however, transmit at a slightly lower speed as is shown in the table of Fig. 1. The retardation existing comes largely from the glass insulators and the resistance of the wires which causes an effective increase in inductance. The greater retardation of cable circuits arises from the increase in capacity between wires, due to the necessity of using a certain amount of solid dielectric, and particularly to the increase in inductance from loading coils which are inserted to reduce attenuation.

In operation, some further retardation is caused by apparatus necessarily inserted at the terminals and at intermediate points along the circuit. Delays because of such apparatus will, in general, reduce the speeds of Fig. 1—which are for bare circuits—by from 10 to 25 per cent.

These transmission speeds are low enough for certain types of circuits to produce an appreciable time of transmission for some of the longer lines of the present day. Several types of problems arise in telephone transmission as a result. The most direct effect is the delay—by an interval equal to twice the transmission time of the circuit—between the asking of a question by a speaker at one end of the circuit, and his reception of the reply.

Telephone engineers have devoted considerable attention to the effect of delays of various amounts, using in their study artificial delay circuits of several types, electrical, mechanical, and acoustical. They have found it possible to talk fairly satisfactorily over circuits with time delays as great as 0.7 second in each direction, but recommend for commercial service delays of only about a third of that amount.

With non-loaded construction, transmission speeds are high enough so that conversations could be carried on between the most remote places on the earth without difficulty. For loaded circuits, however, the situation is different. With a 4,000-mile circuit, representing perhaps the greatest wire-line distance between any two points in this country, a two-way delay of 0.8 second would be introduced by using the slowest construction listed in the table.

Another direct effect of the time of transmission on telephone conversation is a distortion of the speech waves due to unequal velocities for different frequencies. The effect of this is to introduce transients which make the received wave of different form from that sent out.

This distortion is pronounced only when the circuit is long compared to the wave length of the frequencies to be transmitted. For electrically long circuits care must be exercised in their design to insure that the times of transmission for all frequencies of the transmitted band are sufficiently alike to avoid objectionable effects.

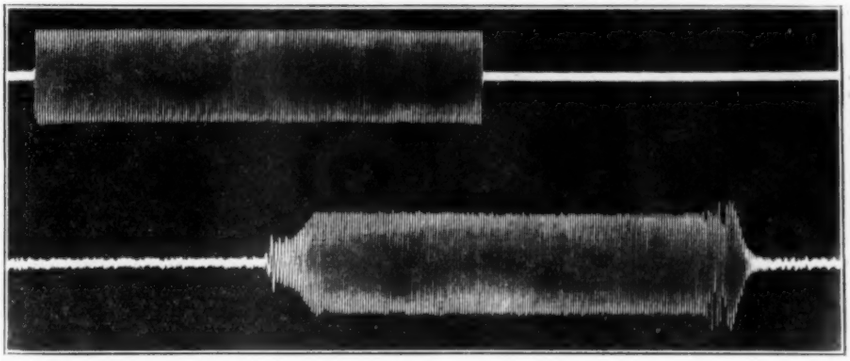


Fig. 2. Illustrating Delay Distortion Where the Higher Frequencies Are Delayed More Than the Lower.

When any wave shape is applied to a circuit, the transmitted wave can be mathematically expressed as the sum of an infinity of sinusoidal waves of frequencies ranging from very low to very high values.

If then a sinusoidal wave of some single frequency is suddenly applied to the sending end of a line, the effect may be considered as due to an infinity of sinusoidal waves so proportioned and phased as to add up to zero until the instant of application of the wave, and at that instant to equal the steady-state value. These component waves are propagated over the line individually, each with a definite velocity.

If the transmission speed of the line is the same for all frequencies, the overall wave shape will be the same at the receiving as at sending end. If the velocity is not independent of frequency, more or less distortion will accompany the establishment of the wave.

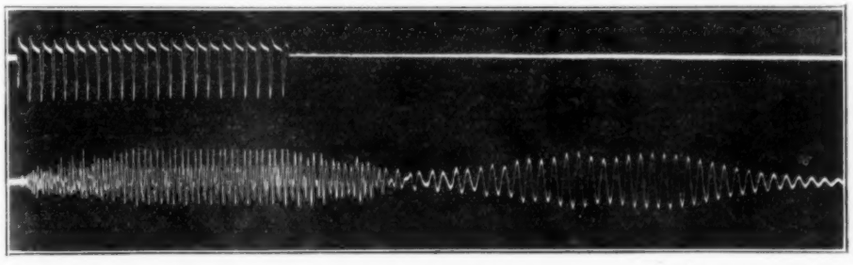


Fig. 3. An Example of Delay Distortion When the Lower Frequencies Are Delayed More Than the Higher.

Distortions produced by delay are well illustrated by oscillograms showing various types of impulses as they are sent and as they are received. Fig. 2 shows such oscillograms for a spurt of 1,600-cycle current applied to and received from a loaded

circuit with delays in the upper part of the transmitted band fairly large compared to those in the lower. It will be observed that because there is a general delay for all frequencies, no discernible

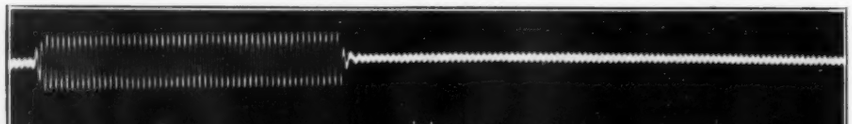


Fig. 4. Delay Distortion May Be Corrected to a Large Extent by the Use of Delay Equalizers. The Sending, Receiving and Corrected Waves Are Shown.

effect reaches the receiving end until a definite time after the application of the current at the sending end.

Because of smaller delay, the components of lower frequency arrive first, and only after a definite time does the received spurt resemble the applied form. At the end of the spurt somewhat similar distortion occurs except that the higher frequencies, because of their greater delay, form the tailing-off section.

When the frequency-delay characteristics of a circuit are opposite to those applying to the last illustration—that is, when the delay is greater at the low frequencies and less at the high—the effect is quite different, as shown in Fig. 3. The applied current in this case was of 200 cycles, but contained many harmonics. Here the high frequencies are received first and the low frequencies enough later to give the appearance of a double spurt of current.

It is possible to correct for distortions of this kind by the insertion of proper networks. In Fig. 4, for example, are shown three oscillograph records of a 1,000-cycle current sent over 600 miles of composited, No. 19 gauge, loaded side-circuit. The upper line shows the applied spurt; and the middle line, the received current.

The effect of delay distortion at the beginning and end of the spurt is plainly evident. The last line shows the received current when delay correcting networks are employed. By their use the transients at the beginning and end of the spurt are almost completely eliminated although the delay in the reception of the signal has been somewhat increased.

Still another result of the existence of appreciable times of transmission is the production of echoes caused by reflection of electrical energy at points of discontinuity in the circuit. Some of them return to the receiver of the talker's telephone so that, if the effects are severe, he may hear an echo of his own words. Others enter the receiver of the listener's telephone and cause an echo to follow the direct transmission.

Such reflections occur, of course, regardless of the magnitude of the time of transmission, but they are usually considered as echoes only when there is an appreciable delay in the transmission. The seriousness of the effect is thus a function of both the time delay and the loudness of the echo.

Although echo effects occur in all actual telephone circuits, it is only when the circuits are long enough to require a number of repeaters that they become serious. The length of such circuits makes the echoes appreciable, and the repeaters, because they overcome the high attenuation in the circuit, make the echoes even louder.

The most important points of discontinuity are at the ends of the circuit since echoes from these points have the longest distance to travel and thus are delayed the most. In four-wire circuits these are the only points of discontinuity, but successive echoes may occur, circulating around the circuit as shown in Fig. 5.

Reflections occur at each end of the line at the balanced transformers which join

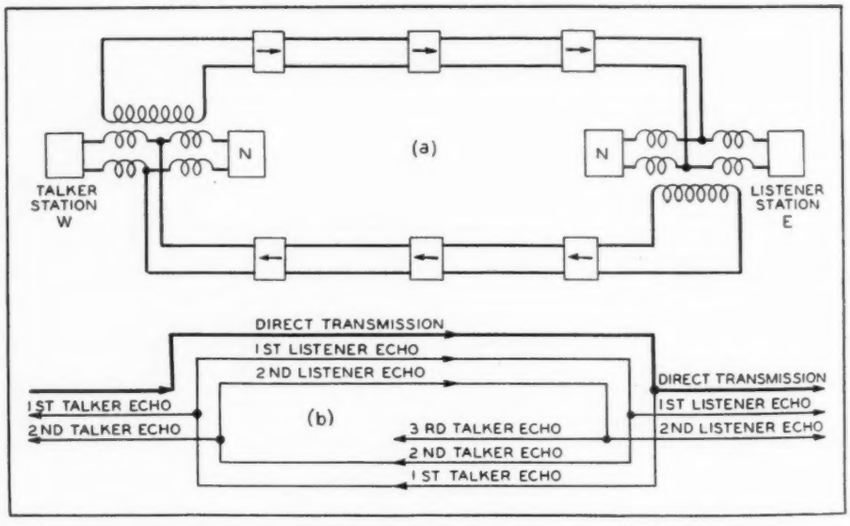


Fig. 5. Although Echoes Occur Only at the Ends of a Four-Wire Line, They May Circulate Around the Circuit Several Times.

the two separate one-way circuits, comprising the line, to the wires running to the subscriber's set. They are caused by imperfect balances between the networks, *N*, and the subscriber loops. The more accurately networks simulate subscriber circuits, the less applicable will be the echoes, but it is impracticable to obtain perfect balance in an economical telephone plant.

In a long two-wire circuit, because of the use of the balanced transformers at each repeater, many more echo paths are possible. Although echoes can affect both talker and listener if pronounced, they generally have the greatest effect on the talker who may gain an uneasy feeling that the listener wishes to break in on the conversation.

Although time of transmission is thus in many ways something to be compensated and corrected, it is used to advantage in certain very long circuits. Here, in the form of delay circuits, it serves as an auxiliary to switching devices employed for preventing both the building-up of undesirable echoes and, in long radio telephone circuits, the occurrence of instability or the setting up of oscillations.

Another effect of the time of transmission is the phenomenon of fading in radio, due to trains of waves arriving simultaneously at the receiver over two or more paths which have different times of transmission. These trains of waves from the transmitting station are received sometimes in phase agreement, strengthening, and alternately in opposition, weakening, the received signal.

Although mentioned here for completeness, this phenomenon is beyond the scope of this article, which is limited to conditions holding when not more than one path is employed for transmission in each direction.

There are, of course, other effects of the time of transmission of electrical currents. For telephone circuits, however, the major effects have been covered. For the most part the delays are short, but with the prospects for talking over ever-increasing distances, opened up by modern developments, they promise to play a part of continually increasing importance.

Annual Meeting of Georgia Association

National Problems Hold Attention of Telephone Men at Georgia Telephone Association's Annual Convention in Atlanta—Resolution Adopted Opposing Proposed Federal Taxes—Depreciation Order Discussed—Officers Elected

The program at the annual convention of the Georgia Telephone Association held on February 16 at the Piedmont Hotel, Atlanta, covered a variety of subjects of interest to telephone people. One of the most outstanding of these was a discussion of taxes, and the association adopted a resolution to be presented to Representative Crisp opposing a federal tax on the telephone industry.

The depreciation order of the Interstate Commerce Commission and how it affects companies in the Southern states was commented upon by telephone men present and helpful suggestions were offered.

Tuesday Morning Session.

The meeting was called to order on Tuesday morning, February 16, about 11 o'clock by President Wm. R. Bowen of Fitzgerald, Ga. In his annual address President Bowen reviewed the operations of the industry during the past year and stated that he had enjoyed immensely his associations with the telephone men and expected to keep up his friendly contacts with them.

The minutes of the previous meeting were read by Secretary J. L. Mathews, of Statesboro, and unanimously approved.

The treasurer's report showing the financial condition of the association for the past two years was then read by Secretary Mathews and approved.

At this point J. Prince Webster, of Atlanta, announced to the delegates present that the association had prepared a very fine lunch and hoped that everyone present would attend. Free theater tickets were distributed for a performance at one of the theaters for that night.

President Bowen appointed as a committee on elections for 1932 officers and directors the following: C. G. Beck, of Atlanta, chairman; W. M. New, of Thomaston; and J. M. Dent, of Douglas.

The meeting was then thrown into a general discussion of the taxing problems confronting the association at the present time. The round-table discussion concerning this matter was led by Mr. Webster.

The Tax Situation.

C. G. Beck, Atlanta, of the Southern Bell Telephone & Telegraph Co., suggested that a resolution be properly framed and sent to Representative Crisp, setting up the objections that the Georgia Telephone Association wants considered in connection with any taxing legislation that might attempt to place additional taxes on telephone companies, either for exchange or long distance service.

J. M. Dent, of Douglas, also made some very timely comments and suggestions on the general situation.

A round-table discussion of the depreciation order issued by the Interstate Commerce Commission was led by Major S. G. F. Rathborne, Atlanta, of the Southern Bell Telephone & Telegraph Co. The convention adjourned for lunch upon the completion of Major Rathborne's remarks.

Discussion on Depreciation Order.

At 2:30 p. m. the convention reassembled and immediately further discussion of the depreciation order was resumed.

L. W. Hill, Atlanta, valuation engineer of the Southern Bell Telephone & Telegraph Co., presented the result of his study of the matter and made many timely suggestions as to how the subject could be best approached. In addition to what Mr. Hill said, Mr. Beck of the Southern Bell company also reminded the association that the Southern Bell would be more than glad to assist in every way possible any Independent company in Georgia in straightening out such difficulties as it might have in conforming with the order of the Interstate Commerce Commission.

J. Prince Webster, of Atlanta, general counsel of the association, presented the financial and rate difficulties confronting the telephone industry in connection with this new order of the Interstate commission.

Mr. Webster also reviewed at some length the activities of the association during the past two years.

Mr. Beck of the Southern Bell Telephone & Telegraph Co. gave a most interesting talk as to the action that the Southern Bell company is taking as regards the saving of telephone subscriber stations. A general round-table discussion followed as to what each company is doing in this regard and the information presented was of substantial benefit.

Cooperation Between Companies.

Major Rathborne, at the request of President Bowen, explained in considerable detail the situation that has developed in regard to the installation of teletypewriter service and stated that the Southern Bell engineers would be more than glad to furnish any information to the Independent companies as regards this particular type of service, should there be any demand for it in the territories of the various Independent companies.

J. F. Brady of the Lenox Telephone Co., Lenox, talked for some time about the ways in which the larger telephone companies might be of assistance to the smaller exchanges.

The report of the committee on nominations of directors and officers for 1932 was submitted as follows:

Directors: Wm. R. Bowen, Fitzgerald; Chas. G. Beck, Atlanta; J. L. Mathews, Statesboro; A. A. Fincher, Canton; J. J. Doonan, Atlanta; J. M. Dent, Douglas; J. W. Southall, Cairo; W. M. New, Thomaston; A. N. Seward, Fitzgerald; and J. T. King, Milledgeville.

Officers: Wm. R. Bowen, president; Chas. G. Beck, first vice-president; J. L. Mathews, second vice-president; J. Prince Webster, secretary-treasurer and general counsel.

Upon submission of the committee's report it was unanimously adopted and the officers and directors named duly declared elected for the ensuing year.

President Bowen appointed a legislative committee, for the purpose of handling any proposed legislation that might be of interest to the association, as follows: J. L. Mathews, W. M. New, C. G. Beck, J. W. Southall, and J. M. Dent.

President Bowen also appointed a resolutions committee to draw up a proper resolution expressing the Georgia Telephone Association's opposition to the proposed telephone tax legislation now pending in the federal congress. The resolutions committee was composed of the same personnel as the legislative committee.

Tax Resolution Adopted.

The general counsel was directed to draft a resolution for submission to the resolutions committee and thereafter the resolution, as finally adopted, to be forwarded to President Bowen for transmission to Congressman Crisp.

The resolution unanimously approved and adopted by the association is as follows:

"Whereas, Tax payments (all classifications) made by Georgia telephone companies have increased during the past ten years 347 per cent, while at the same time gross receipts have only increased 64 per cent; and

Whereas, Because of the acute and distressing situation now confronting the small telephone companies in Georgia, making current operation most difficult, because of loss in subscriber stations and consequent loss in revenue; and

Whereas, Believing that further tax on telephone receipts, either local or exchange, will result disastrously to the rendition of proper and adequate telephone service by the smaller telephone companies in Georgia which largely serve the rural sections of the state; therefore be it

Resolved, That the Georgia Telephone Association do express to the Congress of the United States its vigorous and respectful protest against any further increase in the tax burden of the telephone companies during the present emergency."

Resolved Further, That a copy of this resolution and protest be transmitted, by the president of this association, to the proper congressional authorities in Washington, D. C."

Dial Installations Claimed to Decrease Employment.

According to information from a study by the Bureau of Labor Statistics made available February 13 by the U. S. Department of Labor, the substitution of the dial for the manual telephone system decreases employment opportunities by about two-thirds.

The two-thirds loss is apparent among exchanges or companies where the conversion to the dial method has been 100 per cent. For the country as a whole, however, there has been no such decrease as yet, for only about a third of the telephones were of the dial type up to the end of 1930, it was pointed out. Operators are most directly affected by technological changes in the telephone industry.

In the Bell operating companies alone, which had 31.9 per cent of its stations on a dial basis in 1930, the net loss of employment opportunities for operators was 69,421, or 32.5 per cent between 1921 and 1930, the study disclosed. The loss for all employes was 71,884.

The calculation is based on an estimate of the number of workers who would have been required in 1930 if the output per employe had remained the same as in 1921.

Similar results are apparent in the Independent telephone companies, it was pointed out.

The ratio of displacement of operators may be expected to rise somewhat as the telephone-using public becomes more accustomed to dial operation, according to the study. It must be noted, also, that the recent trend has been rapidly toward the automatic handling of the simpler types of toll calls. If this tendency continues, it will further reduce the proportion of operators needed after the change to the dial.

The study disclosed, however, that an attempt is being made to handle the displacement problem through such measures as part-time work.

General statistics adapted to the purpose of the inquiry are available only for the Bell companies.

While transition to the dial system has contributed to an increase in productivity of the operator, a number of other changes have also been instituted which affected the output of the workers. For example, the number of calls per operator, in the case of ordinary local calls during the peak of traffic has in this way been increased about 10 per cent by simple device of "restricted repetition"—that is, the repetition by the operator of telephone numbers being called only in case of uncertainty.

Probably the most important changes have occurred in the handling of toll calls. From 1922 to 1930, the average number of minutes required to establish a toll connection was reduced from about 12 to 2. In 1930, 82 per cent of the toll calls were made without the calling subscriber's hanging up the receiver.

Many other improvements have also been made, and the increased efficiency—namely, the gain in operator productivity—has brought an accompanying loss of employment opportunities.

The problem of what to do with surplus employes did not become acute until after the beginning of the business depression in 1929. The dial system was inaugurated and has been carried forward as part of a policy of scientific study and long-term planning, which has included a serious attempt to meet the problems of labor arising out of conversion to automatic operation.

In this matter, the telehone industry may safely be said to have been exceptional, though in this field, as well as in other industries, the intensification of the problem of surplus labor by the present industrial crisis seems not to have been foreseen or provided for.

Since 1929, the problem has been handled in a manner indicated in some degree by a public announcement made by a telephone company official last November, concerning plans for a projected "cut-over" to dial.

"The dial employment problem is especially difficult," it was stated, "and for a long time, we have only felt able to express the hope that it could be solved without a lay-off, plus a determination to avoid one if possible. However, with the greater anxiety felt by the whole community that employment should not be diminished, and the further study we have given the situation, we now feel warranted in promising employment to all our regular employes involved."

It was pointed out that this would not apply to temporary employes and that part-time work by regular employes might be necessary for actually putting the plan into effect.

FEBRUARY

By Miss Anne Barnes,

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

We should not wish our life away, but that is what we do when we wish for the days of February and March to fly. I do not think we feel that way about other months of the year. These two months have their purpose. We do not doubt that, nevertheless, we wish them to be gone with their ice, sleet, snow, and wind so that spring may be ushered in.

February is the shortest month of the year, but in its short span is weather which varies between zero, sometimes lower, and an advance showing of April weather. February is a tricky month. Overnight it can isolate us from the world with great stretches of snow. It snaps its icy fingers and, presto! the highways and other means of travel are heaped here and there with snowdrifts. And the world seems smaller to us, especially when we know that mail will be delayed until these barriers are removed. Sometimes it does not spare us even the comfort of the telephone or telegraph communication. It drives us into the warmth and shelter of home after office hours.

February does us one good turn, at least. It makes us appreciate more our home life which we have been growing away from in recent years. As the wind whistles and moans around our home we feel a sense of shelter and security. We settle down after the evening meal and enjoy the companionship of home folks, and a good book.

How much more enjoyable is this night at home doing nothing or something, according to our mood, than gallivanting downtown or elsewhere in search of entertainment which is quite likely to be disappointing and put us out of pocket, too. Contrast makes values. The little home things take on an enhanced value, and the running about night after night in search of pleasure impresses us as cheap and valueless.

There is another thing about February that interests me—the clarity and brightness of its sunlight. There is no warmth in this sunlight, although we are led to believe so until we get out into the open. Its purpose seems to be to put February, dressed in snowy garments hung with crystal trimmings, in the spotlight.

Let us remember February that way. It does not array itself so beautifully for people in all lands.

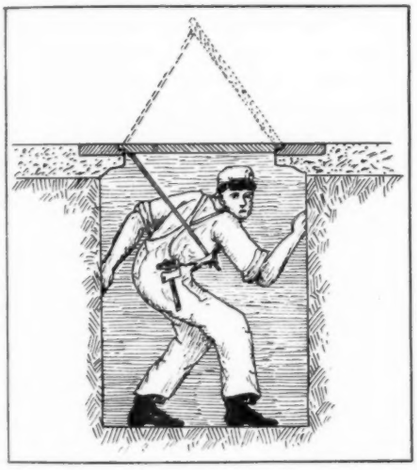
Outside Plant Men Talk Things Over

Manhandled in a Manhole by the Cover Closing.

By Old Cable Splicer.

By this time I imagine that everyone considers me a bigger liar than a wet Senator voting dry. I still maintain, however, that I tell nothing but the truth, for publication. This week I am going to spin you a truthful yarn about another time I was trapped in a manhole which was just as unpleasant as, and really more dangerous than, the time the horse fell in on me.

A few old-timers in the telephone game will probably remember when some manhole covers were hinged on one side like a vanity case and were provided with a prop to hold them up, something like the old cellar door. This prop was hinged on one side of the cover and the other end was placed on the edge of the manhole collar in a shallow socket provided for the purpose.



A Cable Splicer Is No Longer Likely to Be Stabbed in the Back by a Manhole Cover Supporting Rod as Almost Happened Here.

You youngsters can readily see that this was a cumbersome, unhandy arrangement which never proved successful, so it is not in use today. Luckily splicers all seemed to be skinny in those days, so they could crowd in by the brace; but some of them surely would be out of luck with this arrangement today.

I was working in a manhole right out in the middle of Main Street one day and my helper was fussing around trying to get the furnace started at the edge of the manhole. Traffic was neither heavy nor fast in those days, so there was no difficulty in keeping the tools near the manhole, even though it was located in the center of Main Street. Such an arrangement would not be very healthy on even a small-town Main Street today, I fear.

Well, that day I was humped over working on a splice when all at once I heard a terrible commotion, people yelling, horses running, and the clanging of a fire engine gong coming nearer.

My helper getting panicky, hollered "fire," and kicked the brace from the manhole collar, permitting the lid to fall with a bang which sounded like the Chinese artillery going into action. At the same time something scraped my side and gave a terrible yank on my suspenders.

At the time I thought that a metal pot or some other heavy object had been kicked into the manhole and had just missed me. The manholes in those days were neither large nor deep, so I had to stand in a rather cramped position until the crowd moved on and my helper finally had the presence of mind to raise the cover again. I could have lifted the cover from the bottom side, but I feared that I might have a horse on me if I did.

I was glad to lift my head above ground level and have a look around to see what had happened. I found that the cover brace had just grazed my side and had punched a hole through the bib of my new overalls—and then I was mad.

It was a lucky thing for me that the brace did miss me, for I had been directly in front of it—even though the end was blunt, it was small—and with the weight of the cover behind it, it would have pierced me as the fishhook does the unsuspecting worm. I did not think much about the danger at the time, but was sure sore about getting my new overalls torn, and I had to sew them up with a piece of wire.

Tall Poles Support Wires on Long Span Across River.

For more than 20 years two giant cedar telephone poles, each 115 feet tall, have supported local and long distance telephone wires crossing the Skagit river at Mount Vernon, Wash.

Built in 1910 on the general plan of a suspension bridge, the crossing is 520 feet in length. Each pole has a heavy double crossarm. Two strands of half-inch steel cable, carried over the ends of the crossarms, support three fixtures spaced at equal distances over the river. These fixtures, in turn, each consisting of four crossarms strapped together with vertical angle irons, support the copper telephone wires and the telephone cable.

In spite of their long service and the constant heavy strain, the poles are in excellent condition, a recent inspection showed. Twice within the last 10 years linemen have ridden out on the span to make wire repairs.

The crossing was built by the Pacific Telephone & Telegraph Co., but it is now a part of the West Coast Telephone Co.'s system, which acquired it some years ago.

Always Be Prepared an' You'll Never Be Sorry.

By Jake the Lineman.

Mornin', buddies! How's the ole world a treatin' you?

If yer well an' happy, got a job an' have steered clear of "Ole Man Accident" so far this year—then you've sure got a lot to be thankful fer.

I'm sure glad to see so many of you fellers out fer practice this mornin' fer I've got a heap of instructions that ought ter be a real help to all of you.

Every year there are thousands of humans who are allowed to die just 'cause the folks with them didn't know the Prone Pressure method of resuscitation! It must be an awful feelin' to drag the lifeless body of a friend er relative from the water, a burnin' buildin', a gas-filled room er manhole, er off a pole—an' then to realize that you are absolutely helpless, because you do not know how to revive him. Precious minutes have to be wasted goin' fer aid, an' when aid does finally arrive, life is so far gone that it is impossible to bring it back.

Every one should know the Prone Pressure method. Foremen should teach it to all their men an' make absolutely sure that every man can correctly an' efficiently use the method.

Time should be taken each week an' every man in the gang should demonstrate to his foreman that he thoroughly understands the method.

The method isn't as easy as it looks an' it takes lots of time and practice to really get the hang of it—but if some day you use the method an' save a life, you'll be more than repaid fer the time you spent.

'Fore I start tellin' you how to use the Prone Pressure method, I'm gonna tell you a few facts which I think will make things I'm gonna say a lot easier ter understand.

A normal feller breathes every five seconds or 12 to 15 times a minute. A shock, such as electrical, gas fumes er water, paralyzes the normal breathin' organs, the diaphragm, the lungs an' finally the heart, an' renders 'em useless. Resuscitation is the process of restorin' these organs to their natural functions. The Prone Pressure method is the most widely-used method, an' generally it is successful.

Now let's find out what our lungs really are. They lie in a closed cavity formed by the ribs an' walls of the chest. Draw in a deep breath of air—yer lungs have expanded; now let the air out—the cavity of yer lungs is now smaller. When the normal organs are paralyzed, some artificial means must be used to force air in an' out of the lungs. It has been foun' that by successively compressin' an' releasin' the

chest walls, air is brought into the air passages and then forced out. If you an' I know the method, then we are prepared; but if we don't know—we'd better learn it right now.

Now, if yer all a settin' comfortable an' ready to catch an' hold onto every word, I'll explain the Prone Pressure method to you. Everybody rarin'? O. K. Let's go! Our first signal is:

Always remember four vital things:
First: Prompt attention.
Second: Proper position.
Third: Proper application.
Fourth: Persistency. You must be persistent in yer efforts an' stick to yer job until the stiffness of death comes over yer patient.

Remove all foreign objects, such as terbaccer, gum, er false teeth from the victim's mouth. Make sure that the air passages are clear.

Ties, belts, collars and all clothin' must be loosened.

Immediately after clearin' the air passage an' loosenin' the victim's clothin', lay the victim face downward an' then follow these rules:

1. Extend the arms to the front on either side of the head, in much the same manner as you do when you lift yer hands straight above yer head.
2. Bend one of the arms at a right angle at the elbow, palm downward, and lay the patient's face on the back of the hand with his nose pointin' toward the finger tips.

Fix yerself astride the patient by straddlin' the patient, with knees restin' on the groun' about in line with the middle of the patient's thighs.

Incorrect pressure is worse than none at all, so follow these instructions to the letter:

1. Place the palms of yer hands on the small of the victim's back. The fingers should be restin' on the ribs an' the little finger reachin' just below the last rib.
2. Hold the thumbs an' fingers naturally so the pressure will be on the heel of the palm.
3. Don't bend yer elbows!

Count one, two, three, an' as yer countin' swing forward slowly, so that the weight of yer body is gradually brought to bear upon the victim. Do not press too heavily fer that might injure the internal organs.

Immediately throw yer hands sidewise an' away from yer patient at the count of three an' return to an upright position at the count of four. At the count of five, bend down an' at the count of one again start the pressure.

Always keep a constant, steady rythym, an' don't lose it! An' easy way to keep the rythym is to keep sayin' "Pressure on ribs; pressure off." This will enable you ter make the application once every five seconds, an' that means you are doin' the paralyzed organ's work by forcin' air in an' out of the victim's lungs.

Let's see if we've got onto the rythym. It is just one, two, three (applyin' pressure all of the time); at the count of three release the pressure, four (return to an' upright position, astride the victim), five return hands to proper position ready to start pressure at count of one). This rythym should be continued without interruption

Restorin' natural breathin' is yer aim. After it starts, watch it carefully to see that it continues. If it falters, get on the job again.

Every one should be kept away from you an' yer patient. Your patient needs all the air he can get.

Soon as the patient starts in to breathe, have someone pass an ammonia inhalent back an' forth under his nose.

Patient should be kept lyin' down until a doctor orders his removal, or some suitable conveyance is foun' in which he may be taken to a doctor.

If victim vomits, turn his head to one side an' with your fingers keep his mouth clear of all vomited matter.

Rubbing of victim's legs upward toward his heart will aid circulation.

A stimulant of black coffee, er tea (bein' these are days of prohibition) may be given when the victim becomes conscious, unless he is nauseated.

The thrill of all thrills is to know that you have saved somebody's life.

If you thoroughly understand the method, keep practicin' it, don't let it slip away from you.

Only give up the job after the body starts to stiffen!

Now, if you think you've got the method, grab a buddy of yours an' practice until you've got it down to perfection.

Guess that's about enuf signals fer today, but if I've put this lesson over to you, I'm sure happy, fer I know I've done a little good.

Guess I'll be a ramblin' along now, but I'll be back next Saturday, just chuck full of interesting information. Until that time, so long, an' remember that practice makes perfect an' when yer perfect yer prepared.

The Menace of Trees Along Toll Routes.

By J. F. Brady

So many writers have stressed the need of preventing troubles in local plants that I have wondered why we do not have some constructive criticism and far-seeing, suggestive remedies for the permanent removal of the principal causes of constant trouble in certain sections of toll routes. Such interference costs large amounts of money to clear; yet no major effort has been made to remove the cause.

When total failures occur in toll routes it always affects the service of the most valuable customers and creates a dissatisfaction that a gross of local failures would not do.

Trouble occurs so frequently in certain spots—invariably, it seems, in awkward places—that the expense of a few trips would probably amount to enough to cover the cost of rerouting that portion of the pole line. In any case, however, these "sore spots" are not only a dead expense but, like a parasite, sap the vitality of the entire system.

In the earlier pole-line construction, it was necessary to consider the means of transportation then available. Most of the circuits were installed along the railroad right of way, in sight of passing trains, and the troubleman could watch the lines from a car window, or the doorway of the baggage car.

Nowadays the lineman, traveling in a car on the highway, finds he usually has less chance to see the route; so he has to lose time 'cutting in' for a test, to prevent 'running over' his trouble. If he attempts to drive through the woods and risk a breakdown, he is usually balked by uneven ground and fallen trees. The result is he may have to do some walking, weighted down by test set and tool bag, with a coil of wire for a neck bracelet, exposed to the weather, and the chance of having to side step a snake or some hostile cattle.

This class of trouble generally occurs during a stormy season, and the lineman has to do a class of work which occurring in town would be handled by a gang. So he has to hustle to get out of the woods before dark.

Summing it up, I have found that spots which have the most recurring troubles are the most difficult to reach and the costliest, for we must remember that there are a number of losses in a toll line failure—traveling expense, lineman's salary, idle time of toll operators, revenue lost from "OD" circuits; and last but even more important, our loss of reputation for continuous service.

I had so much trouble from trees and timber hauling along one route that I compared figures and found that the actual cost of maintenance for a certain period was more than the gross revenue from toll calls on those circuits. When the circuits were overhauled properly, we were able to dispense with the services of an extra lineman and transfer him to more important work.

No chain is stronger than its weakest link; therefore, if we want to stop certain drains and keep from going into the red, this is a good time to do several things and at a much cheaper cost than years before or probable in the near future.

Perhaps, when the line was first built, there was a clear right of way cut through, but, oh boy, look at it now! Perhaps some foreman, penny-wise but pound foolish, tried to build along a "bee line"; but visualize how under changed conditions you would *now* lay out the route. What would you do to the old route to bring up its efficiency?

If you are sold on the idea of preventing good money from going after bad, but cannot afford to do it all at once, do a little at a time; and the more you do, the less you will spend for maintenance. It is nothing but false economy to spend a dollar for clearing trouble that could be removed for less than 50 cents pro-rated.

Much of this work can be done, if you go out on a nice day and find out from the owner if he will let you cut down that certain old tree, provided you haul it up to the yard for wood. Perhaps it may be a class of timber that can be bought and used for a pole or crossarms. If you want to

donate it for firewood, possibly the owner will help you remove it. The farmer may need fence posts, too.

In the event that there are a number of logs cut, it might be a good idea to haul them to a siding and ship them by train, after a little seasoning. Then again you might induce a mill man or lumber dealer to buy and cut along your line by offering to pay a premium.

Thinking over these and various other by-products lying dormant in various lines of business, I do not think I am overrating it, if I should claim that there are enough opportunities standing idle which, if acted upon, would change a dull period into a young boom. There always will be such opportunities, more or less, until we reach the saturation point in the development of far-seeing efficiency methods, most of which are just commonsense business plans.

A toll circuit should have such a clearance that any growing tree, falling within the next five years, would not touch a wire.

Every toll wire chief should have a blue print of each toll route showing the distance of poles from railroad and highway, the cross roads, streams, cuts, and where dense growths of trees are. Show from what poles the route may be covered by car, such as from pole No. 357 to 466, then No. 502 to 931, etc.

Then concentrate, first in trying to clear a route through the woods. County records will show the owner's name and a personal interview will usually give you a permit to cut trees, if the original contract for right-of-way does not cover it. Sometimes the telephone and telegraph are so close together that both companies can work in unison and accomplish good results at considerable saving.

If you have some subscribers who have teams, use them to help get out the timber. It will be cheaper than using a truck and it will not only save your truck, but help the team earn some money to pay for telephone service.

The Idle Tree.

Lineman, cut that timbered tree
And save each single bough.
For it was reared to succor thee,
A need that's urgent now.

Let not its canopy of hands
Be left to spread, unseen.
And waste its shade o'er idle lands
Far, far from active scenes.

Its seasoned trunk can shaped to be
A home for young and old;
Its twigs and limbs give forth a glow,
Defying wind and cold.

'Twas never meant that it should grow
And then stand idly by;
To buffet the vagrant winds that blow,
To block the path of progress, and then decay and die.

What Operators Want to Know

Service Is Labor Done For Another—Service Is the Heart of Business—Telephone Company Has Just One Thing to Sell and That Is Telephone Service—34th Installment of Series

By Mrs. Mayme Workman,

Traffic Supervisor, Illinois Telephone Association, Springfield, Ill.

Someone has asked the question: "How can we give better service?" Our answer was: By taking a real interest in the work and by following standard operating practices. I do not think it will be amiss to say something further on this subject.

Let us begin by analyzing the word "Service." Our dictionary tells us that service is "labor done for another." The word service should imply any work performed for the benefit of all concerned.

Management is the head, salesmanship the hands, and *service* the heart of business. All head and no hands—and there could be no business. All hands and no head—and there will be no reason for business. Stop the "service"—and the heart of business stops.

The traffic department is the heart of the telephone industry. The only thing a telephone company has to sell is service; all the more reason why we should strive to make this service as nearly perfect as possible.

There is a big demand today for those who can freshen the situation with smiles and encourage others with the spirit of sincere service. The individual who serves faithfully and well is the best exponent of the word, service.

We have also stated that the use of standard operating practices is conducive to good service. A standard practice is a uniform practice. Uniformity of operating methods makes the use of telephone service more pleasing to the user. This induces him to use the service more frequently.

So let us adopt and follow standard operating methods, and take a sincere interest in our work. If we do this we will be able to render superior service; and superior service spells success, not only for our company but for ourselves as well. Additional revenue, satisfied customers, and new customers make our position with the company more secure.

Questions from Illinois Operators.

1. How long should an operator hold the subscriber's line when given an "NC" report?
2. If a party places a call for the "toll operator" at a distant town, would this be a person-to-person or a station-to-station call?
3. How can we give better service?
4. Do we enter the passed time on a report ticket when we pass a report of "WH on line?".
5. If there is no one there who will talk and the calling party does not ask you to leave word and later we receive a "WH" party report, would that change the classification of the call?

For answers to the questions from real Illinois operators, turn to page 40.

Alert Telephone Operator Saves Bank from Robbers.

A lone telephone operator, alert to her duties in the dead of the night saved the State Bank of Waveland, Ind., from a desperate gang of bandits. What more valuable watchman exists than the telephone which has its nerve-centers distributed wherever they are needed?

About 2:20 o'clock in the morning on February 6, all of the telephone trunk lines leading out of the sleeping village, of about 600 inhabitants, went out of order, cut by the gang as they came into the town.

Miss Ruth Morgan, telephone operator of the United Companies of Indiana, sensing the danger to her town and finding the local lines still working, called T. S. Banta, assistant cashier of the bank and head of the town vigilantes. Then, on his order, she summoned the protectors of the village to mobilize with their rifles.

Meanwhile Howard Worl, manager of the Waveland exchange went to the outskirts of the town, tapped the wires beyond where they had been cut, and summoned help from neighboring towns.

As the vigilantes approached the bank, nine explosions shook the town, but due to the sudden and unexpected appearance of the armed body of men on the scene, the robbers were unable to get away with any loot. They fled in autos amidst a hot exchange of gun-fire.

Two Bell Companies Show Station Gain in 1931.

During 1931 two of the Bell associated companies made station gains. In December, four of the companies showed increases in the number of stations.

The companies producing gains for the the year were the Chesapeake & Potomac Telephone Co. with 20,460 and the Southern New England Telephone Co. with 1,168 stations. The gains for December were contributed as follows: New England Telephone & Telegraph Co., 2,972; the Southern New England Telephone Co., 1,487; The Chesapeake & Potomac Telephone Co., 698; and the Wisconsin Telephone Co., 27.

The figures given do not include purchases, sales or adjustments.

Here and There in Telephone Work

Company Sponsors Essay Contest Among Rural School Children.

The Dakota Central Telephone Co., Aberdeen, S. D., is conducting an essay contest. It is open to all rural children, of school age, under high school, residing in any county served extensively by the Dakota Central company.

"Why Is a Telephone Service Valuable to Farmers" is the subject to be written on, and the essay must be not less than 300 words, nor longer than 600 words.

Parents of contestants need not be telephone subscribers. Complete details and rules are placed in all the offices of the company. The contest closes on March 15.

Sectional Committee on Noise Measurement to Be Organized.

The organization of a sectional committee on noise measurement under the procedure of the American Standards Association was recommended by a general conference of 32 representatives of 18 national bodies held in New York on January 29. It was also recommended that the committee function under the technical leadership of the Acoustical Society of America.

The scope of the project as recommended by a steering committee consisting of Professor Vern O. Knudsen, Acoustical Society of America; E. E. Free, American Society of Mechanical Engineers; P. L. Alger, American Institute of Electrical Engineers; H. R. Summerhayes, National Electrical Manufacturers' Association; R. G. McCurdy, ASA Telephone Group, and Dr. Harvey Fletcher, Acoustical Society of America, is as follows:

"Preparation of general standards of nomenclature, units, scales, and measurement in the field of acoustics, with special reference to noise measurements."

The conference followed a request made by the Acoustical Society of America to the American Standards Association to set up a national committee to correlate the activities of various technical and trade organizations which have been attempting individually to set up standards for noise measurement. Eight such organizations now have committees on this subject.

It was pointed out that the diverse nomenclature and methods of measurement growing out of these uncorrelated activities were interfering with the progress of scientific work on the subject and that without real national standardization this condition would become worse as different individuals became accustomed to different concepts and terms.

For the present the committee's work will be concentrated chiefly on the standardization of nomenclature, units and scales. It is believed that further progress in the science of noise measurement is necessary before effective standardization of this phase of the subject can be completed.

There is some confusion in the measurement of noise at the present time because of the complex nature of noises and their effect upon the ear, and the fact that none of the noise meters yet designed can translate the approximately physiological and psychological effects of noise into definite units of measurement.

Dr. Harvey Fletcher, of the Bell Telephone Laboratories, pointed out at the conference that to the average individual a noise composed of widely-separated frequencies is less disturbing than a noise of equal intensity but having components close together in the frequency range.

Private Branch Exchange Current Supply—Dry Cells (Cont'd).

By John A. Bracken

In a series multiple connection of dry cells to form a P. B. X. battery, the total E. M. F. of the arrangement is the E. M. F. of one of the series connected groups, and the total internal resistance is the internal resistance of the cells in one group divided by the number of groups connected in series multiple.

Connecting the cells in series-multiple makes it possible to obtain a larger current output. Every group of cells which is added increases the amount of current available at the P. B. X. switchboard for, while the E. M. F. remains unchanged, the internal resistance decreases as every group of cells is added.

Sometimes it is necessary to find the number of dry cells which will be needed to supply a given current to a P. B. X. If the internal resistance of the cells were negligible, as in the case of secondary (storage) cells, the internal resistance could be ignored. In the case of primary (dry) cells, the internal resistance cannot be ignored, because the total resistance is not known until the number of cells in the circuit is ascertained.

The required number of cells may be found by the aid of the following formula: $n = \frac{R}{c/I - r}$.

Example: How many dry cells having an E. M. F. of 1.5 volt each and internal resistance of 0.5 ohm, connected in series, would be required to provide a current of 89 milliamperes through a 270 ohm P. B. X. circuit?

$$n = \frac{R}{c/I - r} \text{ or } \frac{270}{1.5/0.089 - 0.5} = 16 \text{ cells.}$$

The internal resistance of dry cells employed on P. B. X. circuits should always be much less than the resistance of the circuit and equipment connected to it. Thus the series connected arrangement of the cells is always used and the results given by the foregoing formula are always applicable.

If the internal resistance of a group of cells approaches that of the external circuit, unless the E. M. F. per cell divided by the value of the current is not at least twice the value of the internal resistance per cell, the series-multiple grouping is required.

The internal resistance of a group of dry cells in series multiple is equal to $n r/s m$. If the number of groups connected in series multiple is 2, the internal resistance of the combination is exactly one-half the internal resistance of a single group of cells forming the battery. Similarly if $s m$ (number of groups in series multiple) equals 3, the internal resistance becomes one-third, etc.

In each case of connecting dry cells in series to form a P. B. X battery, if the cells have been correctly joined together the current obtained will be in accordance with the E. M. F. of the number of cells and resistances. If, however, in connecting a number of cells in series some of them are reversed—that is, the zinc pole of one cell connected to the zinc pole of another and likewise two carbon poles—the total E. M. F. will be reduced, but the total internal resistance will be unaffected.

The total E. M. F. will be equal to the E. M. F. of the larger number acting in one direction less the E. M. F. of the smaller number acting in the opposite direction. As an example, assume that 16 dry cells are connected in series, the E. M. F. per cell being 1.5 volt, and internal resistance of 0.5 ohms and connected to a circuit having a resistance of 600 ohms. What current will be produced if 5 of the cells are connected reversed?

The E. M. F. of the larger number of cells equals $11 \times 1.5 = 16.5$ volts. The E. M. F. of the smaller number equals 5 times $1.5 = 7.5$ volts. Total E. M. F. of the combination equals $16.5 - 7.5 = 9$ volts.

Then $I = \frac{E}{r + R}$ or $\frac{9}{8 + 600} = 0.015$ amperes.

The efficiency of a P. B. X. battery consisting of dry cells is expressed by the formula: $Eff = R/(r + R)$; that is, the resistance of the external circuit is divided by the total resistance of the entire circuit.

Example: A battery of 16 dry cells having an internal resistance of 0.1 ohm per cell supplies 7 P. B. X. extension station

circuits, each with the receiver off the hook having a resistance of 600 ohms (including the switchboard signal, line and station circuit). What is the efficiency of the battery?

The internal resistance of the battery is equal to $n\ r$, or $16 \times 0.1 = 1.6$ ohms. The resistance of the 7 station circuits being uniform and connected in parallel is equal to the value of a single resistance R divided by the number N joined in parallel, or the joint resistance $= R/N = 600/7 + 85.7$ ohms.

Therefore the efficiency of the battery equals $\frac{R}{r+R}$ or $\frac{85.7}{1.6+85.7} = 91$ per cent.

The required number of dry cells for a given efficiency may be determined by formulas. Example:

Assume a current of 400 milliamperes to be supplied through several P. B. X. extension station circuits operating through the switchboard simultaneously. The telephone receivers are removed from the hooks, and the joint circuit resistance is 50 ohms. Each cell supplying this circuit has an E. M. F. of 1.5 volts. Calculate the number of cells needed for an operating efficiency of 85 per cent.

$r = \frac{R\,(1-Eff.)}{Eff.}$. In this formula the per cent efficiency is expressed as a decimal, the resistance R of the external circuit is multiplied by the complement $(1-Eff.)$ of the efficiency, the product is divided by the efficiency $(Eff.)$, and the result equals the battery internal resistance r.

$$r = \frac{R(1-Eff.)}{Eff.} \text{ or } \frac{50(1-0.85)}{(0.85)} = \frac{50 \times 0.15}{0.85} = 8.8 \text{ ohms.}$$

$r = R$, or $8.8 + 50 = 58.8$ ohms, which is the total resistance of the circuit.

$E = I\ R$, or $0.400 \times 58.8 = 23.520$ volts, the required E. M. F. of the battery. As this is a mixed number the next highest integral number, or 24 volts, is taken.

$N = E/e$ or $24/1.5 = 16$ dry cells. Therefore 16 dry cells connected in series will be required to furnish an operating efficiency of 85 per cent.

Northwestern Bell Experiment in Selling Service by Telephone.

The commercial department of the Northwestern Bell Telephone Co. at Omaha, Neb., has tried out thoroughly and with unusual success, the experiment of selling telephone service by telephone. The company has been advising merchants and others to use the telephone in selling what they have to dispose of, and it was suggested that it might be a good idea to take some of its own medicine.

The work has been done by a specially-trained class of girls, seven in number and selected for the job because of special qualifications. They were put through an intensive instruction period by E. A. Hoagland, who is district commercial training supervisor.

The first course consisted in informing the girls what was especially desired of them, the sale of additional serviced equipment, the upgrading of service and the wider use of long distance service. They were told of what the various service consisted, to what use they might be put, and how they fitted into the general scheme of convenient communication.

After that they studied what points they should stress in selling. To make the task all the harder they had to listen to objections certain to be heard and then told how to meet these. Other employes acted the role of customers waiting to be convinced. In addition the class was favored by sitting in on sales talks made by experienced salesmen to actual prospects. When they were ready to go, Mr. Hoagland acted as coach at initial interviews.

Approach and interest rousing consist in asking the subscriber whether his service is satisfactory and meets all needs; if the service is being used for this or that purpose, if additional facilities or service could not be used, if long distance is being employed as freely as is possible. If nothing is sold at that call, arrangements are made for subsequent calls, or for visits by the more experienced salesmen of the company.

The results have been satisfactory. One of the most interesting reactions has come from the fact that the subscriber feels the company is taking a personal interest in the service being given, and thus public relations are helped.

"Where-to-Buy-It" Service Featured in Bell Advertising.

A new advertising campaign of the Bell System is designed to link up with the advertising of manufacturers who are themselves using the "Where-to-Buy It" service and are referring to it in their own advertisements. These Bell System advertisements show a section of a classified directory page with a hand pointing to the phrase, "Where-to-Buy-It."

As far as practicable, these advertisements are to appear in the same issue of the Saturday Evening Post, Literary Digest and Collier's, which contain advertisements of manufacturers whose products are featured in the "Where-to-Buy-It" section of the classified directory which is reproduced in the Bell advertisement.

"Where-to-Buy-It," therefore, is the keynote of this series of advertisements. They are not meant to call attention to the particular product, but rather, to show the reader what he may expect to find in his own telephone book. They encourage him to look first in the classified telephone directory, and many a weary hunt through the stores will be saved thereby.

"May I use your telephone for a moment, please?"
Are You Sure You Are Always Welcome?
Neighbors may borrow any one of a hundred things the best housewives run short of, and still remain friendly, but "may I use your telephone?" is very likely to be considered an imposition by your neighbors. If you had a neighbor who persisted in borrowing things and never returning them, you'd probably at least become impatient with that neighbor. When you borrow your neighbor's telephone, you are borrowing something you cannot repay when you haven't a telephone of your own.
● It is easy to avoid embarrassment of this kind. Find out, now, how easy it is to have a telephone of your own and how little it costs. Just call the Business Office, or ask any telephone employe.
SOUTHERN BELL
Telephone and Telegraph Company
(INCORPORATED)

A Recent Advertisement Which Was Used in More Than 700 Newspapers. It Proved Popular With Telephone Subscribers.

The advertising campaign undertaken by the Bell System this year to increase the usefulness of the "Where-to-Buy-It" service goes considerably beyond the consumer advertising already described. In addition, advertisements telling the story from the standpoint of the business executive are appearing in a business weekly.

The merchandising features of the service are emphasized in still another series of advertisements being run in a number of advertising papers. An interesting thing about this series, addressed primarily to sales managers, advertising managers and advertising agencies, is that the advertisements are in two colors. The second color is yellow, which draws attention to a section of a directory page reproduced in the advertisement.

Latest Telephone News From England

Improvement in Apparatus and Transmission Noted in Telephone Progress in Great Britain—Report for 1931 is Favorable—Service Opened to Foreign Countries—Inexpensive Publicity Means Used by Post Office—News Items

By TELEPHONY'S Special London Correspondent

It is significant of the steady progress that is being made in extending Britain's telephone system that the London telephone area—the area over which any and all of the 750,000 subscribers listed in the two volumes of the London telephone directory can make local calls without the intervention of the "toll" operator—will very shortly cover approximately 1,200 square miles.

There are already 154 exchanges in the London telephone area (including 36 automatic exchanges in a radius of 10 miles from the center of London) and this number will be increased to 221 by the new extension of the area. This will bring into the London telephone directory important towns from all points of the compass, such as St. Albans and Watford in the North, Staines and Weybridge in the West, Gravesend in the East and Leatherhead in the South.

We are, of course, just in the stage of development—or perhaps, more accurately, of under-development—at which spectacular growth would normally occur; all students of the psychology of telephone growth will have in mind the striking growth recorded in America after the installation of the first two or three million telephones.

But these are not normal times, far from it, and dramatic figures must not be expected until general conditions improve. It is certainly encouraging to be able to put it on record that definite progress is being made in spite of the depression.

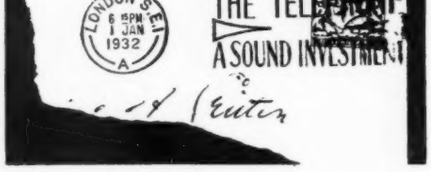
Side by side with the growth of the system—the one being, of course, an essential contributory factor to the other—one notes improvement in apparatus and transmission. Much progress has been made in London with the introduction of a device enabling operators at manual exchanges to reach subscribers connected to an automatic exchange without the aid of an operator at the automatic exchange.

The required number is thus keyed direct from the manual exchange, the keyed figures being transmitted by various combinations of currents of four different frequencies, operating tuned relays at the automatic exchange. Sixty-four manual exchanges in the London area are scheduled for the installation of the necessary additional apparatus and modification of the operators' cord circuits.

Modifications of this kind make it feasible to operate a number of circuits without any loss of efficiency through attenuation of speech, and have been found specially valuable for the long distance service between London and Glasgow, Aberdeen, Newcastle and Edinburgh.

The annual report of the London telephone service claims that this achievement puts Britain well in the van of progress as regards speech transmission and has encouraged the decision to extend the improvement to the main trunk lines throughout the country as quickly as possible. It is quite obvious that telephone engineers over here are going to be busy in 1932, however difficult it may prove to be for the rest of us to find an outlet for our business energies.

The annual report makes special mention



Section of an Envelope Received at Everett, Wash., by an Employe of the West Coast Telephone Co. From His Father in London, England. "This Stamp Cancellation," Says E. R. Hannibal, General Manager of the West Coast Company, "Illustrates the Point Which Most Telephone Companies Are Trying to Get Across to Subscribers Now: That Telephone Service Should Be Regarded as an Investment Rather Than an Expense."

of the frequent use of the transatlantic telephone circuits for broadcasting purposes; one remembers particularly the series of 24 talks organized by the Travel Association ("Come to Britain") which were relayed simultaneously from 300 radio stations in the United States of America.

In the matter of Anglo-European circuits, too, 1931 has shown a clear advance. The old indirect routes between London and Budapest, Oslo, Prague and Rome respectively, have been replaced by direct circuits. An additional circuit, carrier wave, has been brought into service for the Anglo-Holland traffic; this is a type of wired "wireless," superimposed on the existing ordinary telephone circuits in the cable.

Everybody knows that a pair of wires is normally required for a telephone conversation, but modern telephone engineering devices now permit not only eight conversations to take place over the eight pairs in a cable, but another 11 additional conversations to be carried on simultaneously without interference between any of the circuits.

Improved transmission efficiency has brought Rumania and Jugo-Slavia into the Anglo-European Continental network, and the whole of Italy and Finland are also available. Sardinia can now be reached by using radio links from Rome and Majorca, in the Balearic Islands, by a similar radio extension from Madrid.

The statistically-minded will be interested to have the reminder that, although the amount of electrical energy expended during an individual telephone conversation is almost infinitesimally small, the Post Office uses, for telephone, telegraph and postal services in the London area, the far from negligible amount of 20 million units of electrical energy per annum, and can thus claim to be one of the largest consumers of electrical power in the country.

Telephone Publicity.

In 1931 the average number of telephone calls per week in Great Britain and Northern Ireland reached a total of about 14,000,000 and the Post Office is going ahead rapidly with improvements in the service and equipment which, it is anticipated, will further increase the use of the telephone.

The telephone facilities are being advertised extensively in the newspapers. For several months most letters in Great Britain have been cancelled with such messages as "You are wanted on the telephone," "The telephone—a sound investment," "It is quicker to telephone," and "The best investment—a telephone."

Hullo, Cape Town!

The opening of the new telephone service between Great Britain and South Africa on February 2, forges another link in the ever-extending chain of world communications.

The service was inaugurated by British Prime Minister Ramsay MacDonald, who in the course of his 5,000-mile conversation with General Hertzog from No. 10 Downing Street, said: "Your voice is not a distant voice, but the voice of a neighbor. Surely this telephone will be a boon, simplifying the working of commerce and carrying the voices of friends over thousands of miles."

It is claimed for this service that in a very short time it will be possible to transmit not only telephone conversations but telegrams, pictures and facsimiles with the same apparatus simultaneously.

Communications will be available to and

from all parts of Great Britain and Northern Ireland, but will be restricted initially in South Africa to calls to or from telephone subscribers in Cape Town and an area in the South around Port Elizabeth. The service will not be open on Sunday.

When Mr. MacDonald opened this service his voice traveled over 85 miles of land line to the transmitting station at Rugby, then over 5,000 miles by radio to South Africa and finally over 14 miles by land line to Cape Town.

Changing King George's Telephones.

The telephone system of Buckingham Palace, King George's chief residence, has been entirely rearranged during the last two or three weeks. Buckingham Palace used to be connected with an old manual exchange, but it has now "gone automatic." The Palace has its own private telephone exchange and post office and both are kept busy when His Majesty comes to town.

The new instruments which have been installed are of the hand-microphone type, combining mouthpiece and receiver, which has always been favored by telephone users at Court.

At Sandringham, King George's country residence, the telephone has been of the utmost benefit to the King, who has used it to keep in close touch with the Foreign office and the Prime Minister during the trouble between Japan and China.

Teleprinter Becoming Popular.

Hundreds of business men have stated their intention to install a teleprinter when the British Post Office puts it into public service in the course of the next few months.

It is probable, says a London daily newspaper, that there will be no fewer than 1,000 teleprinters in London alone when the service opens. The Post Office is relying on extending its use in the commercial world by a steady insistence on the fact that the reply to an important letter can be sent back by the same method immediately, and that messages can be transmitted, even if there is nobody at the other end of the line.

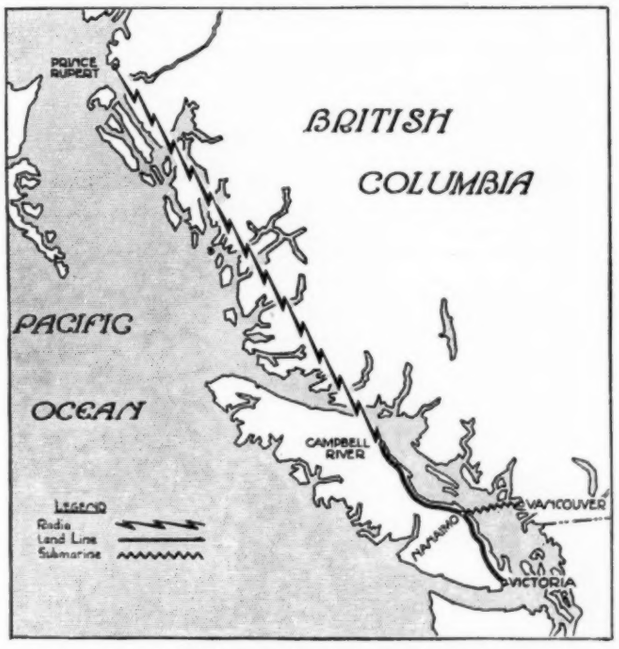
British Columbia Isolated Town Reached by Radiotelephone.

Prince Rupert, largest community in northern British Columbia, Canada, was given its first telephonic connection with the outside world on Friday, January 15, by a combination of radiotelephone and physical circuits. Heretofore telephonically isolated, because the rugged British Columbia coast line made the providing of service by wire out of the question, Prince Rupert can now reach by telephone any point with which the British Columbia Telephone Co.'s long distance system can be connected.

A radio circuit, bridging a 400-mile gap between Prince Rupert and Campbell River, on Vancouver Island, provides the link that makes the new service possible. At Campbell River connection is made with the British Columbia Telephone Co.'s long distance lines.

New radiotelephone sending and receiving apparatus has been installed at Prince Rupert by the Northwest Telephone Co., which is associated with the British Columbia Telephone Co. This equipment is linked to Prince Rupert's municipal telephone system.

When a person speaks over the new circuit from Prince Rupert, his voice is hurled into the air and picked up at a radiotelephone station at Campbell River, from which telephone wires carry it to its destination.



Map Showing Radiotelephone Circuit Which Bridges the 400-Mile Gap Between Prince Rupert, Northern British Columbia City, and Campbell River, Vancouver Island, Thereby Giving Prince Rupert the First Long-Distance Telephone Service in Its History. At Campbell River Connection Is Made with the Long-Distance Lines of the British Columbia Telephone Co.

On a call to Vancouver, the voice is then carried by land lines from Campbell River down the island to the city of Nanaimo, and then across the Gulf of Georgia to Vancouver by submarine cable. The circuit route from Prince Rupert to Vancouver is 545 miles long.

A ceremony in which prominent citizens of Vancouver, Victoria and Prince Rupert took part by inter-connected telephones marked the opening of the new service.

Prince Rupert is the third British Columbia point to be given its first long distance telephone service by radio. An Ocean Falls circuit was opened last April, and Powell River was given service in the same way in May of 1930, but the latter is now served by a submarine cable laid since that date.

Colombia, South America, Taxes Each Telephone in Private Use.

A tax of 1 peso (about 95 cents) monthly was imposed on each telephone in private use throughout Colombia, South America, in a decree announced by President Olaya Herrera on January 19.

Officials of the British Columbia Telephone Co., Prominent Citizens and Newspapermen Assembled in Vancouver, for Ceremony That Opened the First Telephone Service Between Prince Rupert, Northern British Columbia City, and Vancouver. Around Table, Left to Right: E. P. LaBelle, General Superintendent of Plant; C. H. McLean, Transmission Engineer; E. F. Helliwell, General Commercial Superintendent; D. Fowler, Vancouver Daily Province; R. Bouchette, Vancouver Sun; E. J. Haughton, Division Superintendent of Radio, Victoria; W. A. Rush, Superintendent of Radio, Department of Marine, Ottawa; Harold Brown, Vice-President, Vancouver Board of Trade; Alderman John Bennett; James Hamilton, Vice President and General Manager and Gordon Farrell, President, British Columbia Telephone Co.

The Financial Side of Companies

Miscellaneous Items of Interest Regarding Financial Matters of Telephone Companies—New Securities Issued During Past Month—Figures From the Monthly Reports of Larger Companies to Interstate Commerce Commission

Class A Income During 11-Month Period Increases 1 Per Cent.

The summary of monthly reports of 104 class A telephone companies, each having annual operating revenues in excess of $250,000, as compiled recently by the Bureau of Statistics of the Interstate Commerce Commission and presented on this page, shows total operating revenues of $93,275,152 for the month of November, 1931. This represents a decrease of 4.4 per cent as compared with the operating revenues of $97,545,945 for the corresponding month of the preceding year.

The operating expenses for November, 1931, totaled $64,075,415, a decrease of 4.3 per cent. The operating revenues for the same period amounted to $29,199,737, a decrease of 4.5 per cent. Deducting taxes and all other expenses, the operating income for the same month amounted to $20,887,403 as compared with $22,475,225 for 1930, a decrease of 7.1. The ratio of expenses to revenues was 68.70 per cent as compared with 68.65 in November, 1930.

For the 11 months ended with November the summary shows total operating revenues of $1,060,661,716, a decrease of 2.5 per cent compared to 1930. Operating expenses amounted to $711,963,675, a decrease of 4.4 per cent. The operating income for the 11 months' period, $252,256,252, represents an increase of 1.0 per cent over the corresponding period of the preceding year. The ratio of expenses to revenues was 67.12 as compared with 68.48 for the first 11 months of 1930.

On November 30, 1931, the class A companies had in service a total of 16,928,645 telephones, a decrease of 302,789 instruments, or 1.8 per cent, over the preceding year.

Complete data for the Ohio Cities Telephone Co. and the South East Public Service Corp. of Virginia were not available for inclusion in this report.

Reports of Five Nebraska Companies Show Small Losses.

In spite of the turmoil that has been raised in Nebraska because of distressed agricultural conditions, one of the first five annual reports of telephone companies filed with the Nebraska State Railway Commission showed an increase in the number of farmers served, while the losses reported by the other four were small. One of these reported more telephones taken out in small-town residences than on the farms. Here are brief summaries of the reports filed:

Bertrand Telephone Co., W. A. Schreck, president, and Nat Schreck, manager. Fixed investment, $30,319; total assets, $33,587; common stock issued, $16,000; depreciation reserve, $4,210; surplus reserve unappropriated, $12.087; exchange revenues, $7,469.35; toll revenues, $644.28; miscellaneous revenues, $42.69; total revenues, $8,156.32.

Maintenance expense, $2,016.22; depreciation, $383.78; traffic expenses, $1,453.62; commercial expenses, $2,169.92; total operating expenses, $6,023.54; net telephone earnings, $2,132.78; taxes paid, $156; interest paid, $51.75; dividends paid, $320; profit and loss, $1,605.03. The company had 364 stations at the close of the year, a loss of nine.

Loup Valley Independent Telephone Co. of North Loup, M. E. McClellan, president; R. W. Hudson, sceretary and treasurer, and H. L. Gillespie, manager. Fixed investment, $19,397; total assets, $22,597; common stock, $12,120; depreciation reserve, $5,017; surplus reserve unappropriated, $4,225; exchange revenues, $4,064.35 toll revenues, $314.17; total telephone revenues, $4,378.52.

Maintenance expense, $1,415.22; depreciation, $252.78; traffic expense, $1,200; commercial expense, $841.68; total operating expenses, $3,709.68; net telephone earnings, $668.84; miscellaneous income, $260.40; total net income, $929.24; taxes paid, $314.91; profit and loss, $614.33. Stations in service December 31, 1931, 195; net loss, 32.

Southeast Nebraska Telephone Co., Falls

Items.	Month of November		Increase or decrease (*).		Eleven months ended with November		Increase or decrease (*).	
	1931.	1930.	Amount.	Ratio, Pct.	1931.	1930.	Amount.	Ratio, Pct.
Number of company stations in service at end of month	16,928,645	17,231,434	*302,789	*1.8	.....	.....	.....	....
Revenues:								
Subscribers' station revenues	$59,145,117	$60,399,401	*$1,254,284	*2.1	$ 655,783,202	$ 660,055,523	*$4,272,321	*0.6
Public pay station revenues	3,706,222	3,988,254	*282,032	*7.1	42,788,395	44,893,072	*2,104,677	*4.7
Miscellaneous exchange service revenues	935,495	900,337	35,158	3.9	10,313,488	9,954,119	359,369	3.6
Message tolls	22,760,814	25,240,300	*2,479,486	*9.8	277,034,183	297,003,313	*19,969,130	*6.7
Miscellaneous toll line revenues	4,011,326	4,145,011	*133,685	*3.2	44,073,698	44,832,951	*759,253	*1.7
Sundry miscellaneous revenues	2,685,474	2,837,683	*152,209	*5.4	30,296,774	30,206,697	90,077	0.3
Licensee revenue—Cr.	1,215,641	1,263,659	*48,018	*3.8	13,676,874	13,951,585	*274,711	*2.0
Licensee revenue—Dr.	1,184,937	1,228,700	*43,763	*3.6	13,304,898	13,567,098	*262,200	*1.9
Telephone operating revenues	$93,275,152	$97,545,945	*$4,270,793	*4.4	$1,060,661,716	$1,087,330,162	*$26,668,446	*2.5
Expenses:								
Depreciation of plant and equipment	$17,325,927	$16,528,573	$ 797,354	4.8	$ 185,537,154	$ 176,142,507	$ 9,394,647	5.3
All other maintenance	15,105,292	16,515,939	*1,410,647	*8.5	169,408,074	183,093,829	*13,685,755	*7.5
Traffic expenses	16,515,656	18,840,546	*2,324,890	*12.3	193,512,965	217,767,860	*24,254,895	*11.1
Commercial expenses	9,295,823	9,146,199	149,624	1.6	99,333,387	102,369,509	*3,036,122	*3.0
General miscellaneous expenses	5,832,717	5,931,182	*98,465	*1.7	64,172,095	65,264,766	*1,092,671	*1.7
Telephone operating expenses	$64,075,415	$66,962,439	*$2,887,024	*4.3	$ 711,963,675	$ 744,638,471	*$32,674,796	*4.4
Net telephone operating revenues	$29,199,737	$30,583,506	*$1,383,769	*4.5	$ 348,698,041	$ 342,691,691	$ 6,006,350	1.8
Other operating revenues	$ 68,262	$ 66,227	$ 2,035	....	$ 1,093,861	$ 1,029,420	$ 64,441	....
Other operating expenses	43,525	47,976	*4,451	....	666,678	632,236	34,442	....
Uncollectible operating revenues	789,998	825,487	*35,489	*4.3	8,426,498	8,536,555	*110,057	*1.3
Operating income before deducting taxes	$28,434,476	$29,776,270	*$1,341,794	*4.5	$ 340,698,726	$ 334,552,320	$ 6,146,406	1.8
Taxes assignable to operations	7,547,073	7,301,045	246,028	3.4	88,442,474	84,884,045	3,558,429	4.2
Operating income	$20,887,403	$22,475,225	*$1,587,822	*7.1	$ 252,256,252	$ 249,668,275	$ 2,587,977	1.0
Ratio of expenses to revenues, per cent	68.70	68.65	.05	....	67.12	68.48	*1.36	....

Comparative Data Compiled from November Reports of 104 Class A Companies to the Interstate Commerce Commission.

City, H. G. Duerfeld, president, E. H. Towle, secretary, treasurer and manager. Fixed investment, $228,895; total assets, $256,896; common stock, $68,666; depreciation reserve, $98,485; surplus reserve unappropriated, $72,255; exchange revenues, $48,383.46; toll revenues, $11,092.59; miscellaneous revenues, $1.93; total telephone revenues, $59,477.98.

Maintenance costs, $10,677.93; depreciation, $11,643.07; traffic expenses, $15,304.13; commercial expenses, $12,431.63; total operating expenses, $50,055.16; net telephone earnings, $9,422.22; taxes paid, $2,556.17; profit and loss, $6,866.05.

Exchanges: Falls City, 1,878 stations; Barada, 121; Rulo, 60; Salem, 149; Verdon, 188; Shubert, 202; Stella, 242; total stations at the end of year, 2,850; loss, 178.

Campbell Telephone Co., J. R. Scott, president, and Oscar Banks, secretary, treasurer and manager. Fixed investment, $26,649; total assets, $28,509; common stock outstanding, $7,050; depreciation reserve, $6,503; surplus reserve unappropriated, $13,777; exchange revenues, $6,630.10; toll revenues, $299.31; miscellaneous revenues, $36.58; total telephone revenues, $6,964.99.

Maintenance expense, $1,367.36; depreciation, $132.64; traffic expenses, $1,640; commercial expenses, $606.85; total telephone expenses, $3,746.85; net telephone earnings, $3,218.14; taxes paid, $251.09; interest paid, $4.35; discounts for advance payments and allowance to stockholders on telephones, $1,344.42; dividends paid, $1,022.67; profit and loss, $596.61. Stations at end of year, 403, loss of five.

Stanton Telephone Co., A. W. Forbes, president and manager, and H. D. Miller, secretary and treasurer: Fixed investment, $67,195; total assets, $78,005; common stock outstanding, $4,600; depreciation reserve, $28,361; surplus reserve unappropriated, $2,873; exchange revenues, $15,301.63; toll revenues, $1,071.83; total telephone revenues, $16,373.48.

Maintenance expenses, $2,047.81; depreciation, $2,452.19; traffic expenses, $3,175.50; commercial expenses, $4,053.95; total telephone expenses, $11,729.45; miscellaneous income, $23.00; taxes paid, $612.36; dividends paid, $4,052.36; profit and loss, $614.67. Stations at close of year, 763; a loss of 11.

New England Bell's Share Earnings Increased in 1931.

Net income of the New England Telephone & Telegraph Co., Boston, Mass., for 1931 amounted to $11,675,225 after taxes and charges, equal to $8.76 a share earned on 1,333,457 shares of stock, compared with $11,432,022, or $8.58 a share, earned in 1930, according to the pamphlet report issued on January 29.

Operating revenue was $75,420,021, against $75,176,964 in 1930, and net earnings were $17,545,388, against $16,853,637. Surplus after dividends totaled $1,013,707, against $1,477,691.

President Matt B. Jones, in his report credits the employes for the gain in revenues during 1931. During the year, he says, telephones disconnected numbered 279,820 while 278,149 were installed, a net loss of only 1,671. He attributes this result to the efforts of employes in the year's sales campaign, resulting in an average of nearly ten sales to an employe.

Losses in telephones were largely in the lower grades of residence service, he says, the number of business telephones showing a slight gain for the year. With the consolidation of three small companies purchased during the year, the company shows a net gain of 7,813 telephones for 1931.

Expenditures for construction and general equipment were $28,870,000 in 1931, including $2,888,230 for land and buildings, $6,605,385 for central office equipment, $8,261,834 for station equipment, $8,261,392 for exchange lines and $1,881,804 for toll.

Lincoln (Neb.) T. & T. Report

End of 1931 Finds Company in Favorable Financial Condition; Drop in Rural Telephones Brings Total Station Loss to 2.57 Per Cent—Refinancing and Plant Investment Strengthens Company

Frank H. Woods was reelected president of the Lincoln Telephone & Telegraph Co., Lincoln, Neb., at the annual meeting of stockholders and directors held January 19. J. H. Agee was made a vice-president; and H. W. Potter, assistant treasurer, was named treasurer. He succeeds C. P. Russell, who was secretary and treasurer. Under a redivision of duties, Mr. Russell remains as secretary.

The annual report showed that the company, after reducing common stock dividends from 8 to 7 per cent, reducing salaries and making many minor economies, ended the year with a surplus of $31,120. The accompanying table shows the financial experience of the company for the years 1930 and 1931.

The directors elected are: F. H. Woods, Thomas C. Woods, Mark W. Woods, George J. Woods, Joseph Grainger, J. H. Agee, Charles Stuart and S. H. Burnham, all of Lincoln; George E. Coddington, Auburn; C. N. Beaver, York; Christian Klem, Beaver Crossing; Leonard E. Hurtz, Omaha, and L. B. Stiner, Hastings.

The officers are: President, Frank H. Woods; vice-presidents, Thomas C. Woods, J. H. Agee and S. H. Burnham; general manager, J. H. Agee; treasurer, H. W. Potter; secretary, C. P. Russell. Department heads: general commercial superintendent, W. E. Bell; general plant superintendent, Mark T. Caster; general traffic superintendent, R. S. Brewster; chief engineer, H. H. Wheeler, Jr.; general auditor, I. J. Devoe.

In reporting for the directors, President Woods said that, in view of present conditions, the company closed the year with a measure of satisfaction in the fact that it had met the circumstances and maintained a high standard of service.

Crop conditions were somewhat better in the company's territory than for the average of the state, but the market prices were far from satisfactory. Fundamentally this is the cause for the low level of business in this section. Due to these conditions the company suffered a loss of stations amounting to 2.57 per cent in the average number of owned stations in service during the year. The total decrease in combined exchange and toll revenues was 4.42 per cent.

No applications for increased charges for service were made during the year and no hearings held. The management has considered that any increase in rates, the need for which had been indicated by the necessary rebuilding of exchanges or the installation of improved type of service, should be postponed until general business conditions become less strained.

The company has been confronted with a great many requests from rural subscribers for service rate reductions. It has been necessary for the company to refuse these. Pains have been taken to point out that the rates are made up principally of definite and fixed charges that do not permit of reduction, and that in prosperous times the business is operated on a basis which permits the earning of but a reasonable return on the investment.

It makes no large profits and, if service is to be continued on a high level, it must be permitted to earn a reasonable rate of interest even during adverse periods. In the majority of cases the company representatives were able to convince those concerned of the fairness of its position. Where subscribers have felt that they could not longer afford to pay for telephone service, the telephone has been disconnected with the expressed hope that the period of the discontinuance will be brief.

The company has maintained its plant at the same level of service as has been done in the past. Two severe sleet storms caused heavy losses. Repairing these promptly has been hampered by road conditions, and primitive means of transportation on foot, horseback and with horses and wagons, have been used. The depreciation reserve took care of these losses without affecting earnings, and the ability to meet emergencies of this kind without losses to stockholders again demonstrates the excellence of telephone securities as permanent investments.

(*Continued on page* 30.)

Timing

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STROWGER AUTOMATIC DIAL SYSTEMS

EXCLUSIVE SALES AGENTS
In United States and Possessions

AMERICAN AUTOMATIC ELECTRIC SALES COMPANY
1033 W. Van Buren St., Chicago, U. S. A.

When communicating with Automatic Electric Co., please mention TELEPHONY.

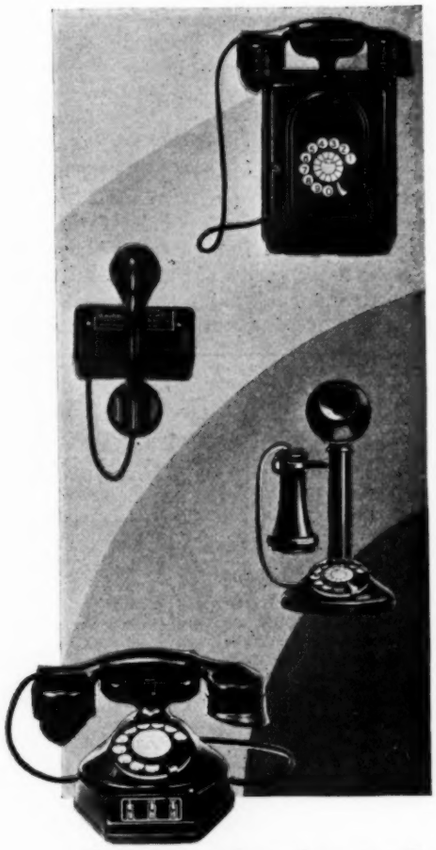
nd Use.....

Ha oved the Monophone's Supremacy

N the Monophone was first designed, the Strowger develop- t engineers approached the problem from two viewpoints. "Let us not only make a telephone whose technical efficiency compare, but let us also put ourselves in the place of the tele- r, and design the kind of telephone HE would like—incor- hose qualities HE prefers."

de produced the Monophone. That it exemplifies those user desires in his telephone, has been proven by its world- ptance and adoption. Surpassing beauty, convenience, ease on and clarity of transmission—all these have made the Mono- best seller" to the public. The use of Bakelite has made these ossible without sacrificing strength, durability and lasting fin- mportant to the telephone company.

new installations and replacement purposes—specify the ne. Why be satisfied with less when you can have the finest? nd prices gladly sent upon request.



The four styles shown above, as well as the Monophone shown in the larger illustration, all utilize Bakelite in their construction. This material combines light weight with toughness and strength and has a deep, beautiful lustre which will not chip, wear or fade.

matic Electric Company

facturers of *Strowger Automatic Dial Telephone and Signaling Systems*
CHICAGO, U. S. A.

EXCLUSIVE EXPORT DISTRIBUTORS
AUTOMATIC ELECTRIC SALES COMPANY, LIMITED
1027 W. Van Buren St., Chicago, U.S.A.

(*Continued from page 27.*)

The 1931 provisional estimate for additions and changes to the physical property was curtailed to correspond with the reduction in demand for plant extension. The exchanges at Havelock and Seward, Neb., were converted to dial service, the former being consolidated with the Lincoln exchange and the latter housed in a new modern building.

Important pole line and transmission improvements were instituted in the toll plant at a time when material costs are more favorable than at any time in the company's history. Total gross additions to plant and equipment for the year were $1,272,500, and net additions $332,000.

The 1932 construction program contemplates taking further advantage of the favorable material market to the extent justified by the necessity for additional plant and equipment replacement.

A material change was made in the financial structure of the company during the year. Heretofore, the company's outstanding bonded indebtedness was covered by mortgage provisions which in many respects were not wholly satisfactory. As of July 1, 1931, these issues were refunded by new first mortgage, 30-year, 4½ per cent bonds, under provisions which in every respect are modern and liberal.

By this refinancing, this proportionately large amount of the company's capital has been secured on a remarkably favorable basis. Mr. Woods feels that it attests the strong position of the company's credit, for few utility companies in the country have obtained funds under better terms. It will be noted that this money rate is even more advantageous than for many governmental subdivisions. The result of the interest rate reduction is toward the reduction of the telephone service cost and directly in the interest of the company's subscribers and the public.

With business recessions and consequent reduction in telephone use, it has been necessary to abandon the old practice of waiting for the public to order service without the use of salesmen. Through the organization of the company's personnel into a compact sales force it has been possible to retain many stations slated for removal, to sell many supplemental services and to secure new installations.

In closing, Mr. Woods said that the directors did not feel competent to predict any exact date on which permanent improvement in business conditions may be expected, but are confident that the outlook is toward such improvement along all lines.

"Rarely has Nebraska soil and subsoil been so moisture laden as at present," he declared. "This reservoir is the greatest assurance we can have for next year's crop production. All indications point toward better products prices. We question whether any previous depression, of which Nebraska has experienced many, has found the state in stronger financial position than at present. We have every confidence in the ability of both the farmer and the business man to tide over the present stringency and look forward with confidence to a normal resumption of business during the coming year."

The company now operates 135 exchanges, of which five are automatic, 102 manual magneto, and 29 common battery manual. The company ended the year with 77,103 company stations and 17,642 connecting stations with 1,404 on service and private lines, as compared with December 31, 1930, the number of business stations, 18,234, represents an increase of nearly 200; city residence service dropped off nearly 1,800 to 40,018, while the big drop was in rural stations, from 23,281 to 18,851.

Connecting stations dropped off nearly 2,000, due to decreases in the lists of other companies.

The average number of employes during the year was 1,312, which is 104 less than the year before. The total payroll for the year exceeded $1,400,000.

The balance sheet of the company as of December 31, 1931, follows:

ASSETS.	
Physical property	$13,095,402
Investments	323,073
Material and supplies	326,211
Cash and deposits	387,921
Current receivables, etc.	326,074
Total assets	$14,458,681
LIABILITIES.	
Capital stock	$ 6,275,800
Funded debt, bonds, due 1961	3,500,000
Bills payable	279,900
Current payables (not due)	444,524
Reserve for depreciation	3,011,962
Other reserves	30,000
Surplus	916,495
Total liabilities	$14,458,681

Earnings:	1930	1931
Exchange revenues	$2,191,415	$2,177,558
Toll revenues	1,016,572	888,491
Miscellaneous operating revenues	67,625	67,483
Total telephone revenues	$3,275,612	$3,133,532
Expenses:		
Operation	$1,127,012	$1,078,548
Current maintenance	633,466	565,202
Depreciation	670,836	657,836
Taxes	218,852	192,600
Total telephone expenses	$2,650,166	$2,494,186
Net telephone earnings	$ 625,446	$ 639,346
Sundry net earnings	76,118	63,310
Total net earnings	$ 701,564	$ 702,656
Interest paid	$ 174,953	$ 198,478
Balance net profits	526,611	504,178
Dividends (preferred and common)	503,024	473,058
Balance for surplus	$ 23,587	$ 31,120

Table Showing Financial Status of the Lincoln (Neb.) Telephone & Telegraph Co. During the Years 1930 and 1931.

Lincoln (Neb.) Securities Co. Reports Operations for 1931.

The Lincoln Telephone Securities Co., of Lincoln, Neb., a holding company organized some years ago to make certain that control of the Lincoln Telephone & Telegraph Co. would remain with the Frank H. Woods group, reports a net income for 1931 of $490,417.

This is made up of dividends received and accrued of $451,029, interest received and accrued, $23,068 and commissions and other income, $16,319. General and miscellaneous expense totaled $11,253 and interest paid and accrued $4,716, a total of $15,970, leaving a net income of $474,446. Dividends on the three classes of securities issued totaled $452,293, leaving $22,153 for surplus.

Frank H. Woods is president; Thomas C. Woods, vice-president; C. P. Russell, secretary-treasurer, and H. W. Potter, assistant secretary-treasurer.

Total assets of the company are $8,094,229.64. Its investments consist principally of the preferred and common stock of the Lincoln Telephone & Telegraph Co., $7,678,358.34. Current assets total $415,739, made up of $241,257.24 secured notes; accrued interest and dividends receivable, $99,663.41, and cash of $78,818.40. Deferred charges of $202.25 complete the total.

Current liabilities of accrued dividends and interest and taxes of $114,678.19; miscellaneous reserves of $15,174.68, capital of $7,869,130.59 and surplus of $95,316.18 are balancing items. The capital is divided into 6 per cent preferred stock of $5,893,950; Class A, common, $876,966.68; Class B common (voting stock), $1,084,333.33, with preferred stock installments showing a credit of $13,880.58.

In enclosing the regular dividend for the closing quarter of 1931, Secretary-Treasurer Russell wrote stockholders that

the dividends were sufficient to pay the regular dividends on the preferred and Class A common stocks, which he regarded as a creditable record under the circumstances.

He said that the annual report of the Lincoln Telephone & Telegraph Co., wherein the Securities company has its heaviest investment, will show that company to be in a sound, strong financial condition.

Insofar as it is possible to now determine, the company has ample funds to take care of its financial requirements for the year and will have for sale only such stock as is offered for resale by stockholders. This is a limited amount, and in the past it has found quick resale, many being on the waiting list.

	1926	1927	1928	1929	1930	1931
Assets	$49,439.54	$52,761.99	$54,736.70	$68,521.48	$70,458.19	$68,017.63
Liabilities	41,624.70	42,068.57	43,673.93	56,052.02	56,171.49	50,410.32
Surplus	7,814.84	10,693.42	11,062.77	12,469.46	14,286.70	17,607.31
Gross income	21,302.00	22,574.02	23,422.13	23,864.15	26,537.16	27,564.90
Gross expenses	18,921.35	18,454.44	19,562.72	19,657.46	21,919.92	21,444.29
Net revenue	2,380.65	4,119.58	3,859.41	4,206.69	4,617.24	6,120.61
Dividend paid	1,241.00	1,242.00	1,863.00	2,800.00	2,800.00	2,800.00

Comparative Statement of Geneseo (Ill.) Co-Operative Telephone Co. from 1926 to 1931 Shows Steady Financial Gain.

Illinois Cooperative Company Has Greatly Increased Earnings.

At the recent annual stockholders' meeting of the Geneseo Co-Operative Telephone Co., of Geneseo, Ill., Robert L. Parker, manager, gave a report of the financial status of the company which showed 1931 to be the banner year. During the year the bonded indebtedness of the company was reduced by $6,000 and the surplus fund increased by $3,000. The usual dividend of 8 per cent was paid to stockholders.

Telephone rentals for 1931 amounted to $21,932, an increase of $901 over the figure for 1930. The company states that last December was the best month in its history so far as rental receipts were concerned. Collections are better at this time than they were a year ago, Mr. Parker said. Toll revenues totaled $5,136; miscellaneous, $308; and interest revenue, $188, bringing the total revenues up to $27,565.

Toll calls originating in Geneseo during 1931 amounted to $10,191.30. This figure is an increase of 13½ per cent over 1930, and of 22 per cent over 1929.

The number of telephones served by the Geneseo exchange was precisely the same at the close of 1931 as at the close of 1930, Mr. Parker said. This number is 1,703. While there was a net loss of 23 subscribers in the rural area, there was a net gain of 23 in the city.

The company will pay 1931 taxes amounting to $1,408.90.

The surplus has mounted from $7,814.84 in 1926 to $17,607.31 in 1931. In 1930 the figure was $14,286.70, and in 1929, $12,469.46.

Gross income for 1931 was $27,564.90; for 1930, $26,537.16; for 1929, $23,864.15; for 1926, $21,302.

Liabilities were decreased from $56,171.49 to $50,410.32, the report shows. Assets showed a slight decrease, from $70,458.19 to $68,017.63. The net revenue amounted to $6,120.61, as compared with $4,617.24 in 1930. The dividend of 8 per cent amounted to $2,800. That dividend has been paid for the last three years.

At the annual stockholders' meeting on January 25, Henry Waterman was succeeded on the board of directors by Alfred Peterson. Henry Diener and A. S. Offerle were reelected.

The financial status of the company is shown in the accompanying tables.

Southern New England Telephone Co. Sets New Revenue Record.

The Southern New England Telephone Co., New Haven, Conn., reports for 1931 a net income of $3,529,454, after depreciation, charges and taxes. This is equal to $8.82 a share earned on 400,000 shares of stock and compares with $3,411,331, or $9.41 a share earned on 362,500 average shares outstanding in 1930, or $8.53 a share on 400,000 shares outstanding at the year end.

Operating revenue in 1931 was $17,619,179, against $17,559,296 in 1930, the previous best year. Net earnings after taxes and depreciation were $4,513,559, against $4,303,408, and total income was $4,693,672 against $4,461,271. Surplus after dividends amounted to $329,454, contrasted with $511,331 in 1930.

President H. C. Knight says in his report that the company continued to finance plant additions and betterments through temporary loans from the American Telephone & Telegraph Co. and expects to follow the same procedure this year. At the end of 1931 these loans totaled $6,000,000.

A net gain of 1,121 stations resulted from 77,208 installations and 76,087 removals. A total of more than 390,000,000 local calls represented a slight increase from 1930. Toll traffic declined only 2 per cent to 25,000,000 calls.

Gross expenditures of $9,125,000 were made for plant additions while plant retirements amounted to $4,097,000. Total plant investment on December 31 last amounted to $75,691,000. Expenditures for cable were less than for any other of the last six years, although about 637,000,000 conductor feet of wire in cable were placed and spliced.

Iowa Company Shows a Deficit Despite Retrenchments.

Adverse economic conditions, coupled with costly property damage caused by the elements, were given as the principal reasons for a deficit in finances of the West Iowa Telephone Co., Remsen, Iowa, at its annual meeting late last month. The secretary-treasurer, W. H. Daubendiek, in his report showed a deficit of $2,261 in spite of a drastic retrenchment policy pursued during the past year.

The meeting was presided over by T. Kloster, president. These officers for the new year were elected: T. Kloster, president; J. H. Beck, vice-president; Peter Eulberg, commercial manager and book-

Assets:		**Liabilities:**	
Plant and equipment	$58,227.20	Common stock	$35,000.00
A. T. & T. stock	2,100.00	Bonds	13,000.00
Cash	5,159.81	Accounts payable	477.08
Due from subscribers	1,551.19	Advanced rentals	73.64
Prepayments	59.13	Taxes accrued	1,254.06
Materials and supplies	375.33	Interest accrued	119.12
Unamortized expenses	544.97	Other accrued liabilities	486.42
		Corporate surplus	17,607.31
Total	$68,017.63	Total	$68,017.63
Expenses:		**Income:**	
Maintenance	$ 2,784.04	Subscribers' rentals	$21,932.37
Depreciation	4,200.00	Toll revenue	5,136.14
Operators' wages	5,880.44	Miscellaneous revenue	308.64
General expense	5,781.97	Interest revenue	187.75
Taxes	1,200.00		
Interest on bonds	907.50		
Misc. charges to income	690.34		
Current net earnings	6,120.61		
Total	$27,564.90	Total	$27,564.90

Financial Statement of Geneseo Co-Operative Telephone Co. at Close of December 31, 1931.

keeper and W. H. Daubendiek, secretary and treasurer. Directors are William Schnepf, Mr. Kloster, W. H. Daubendiek, H. J. Reimers, Peter Eulberg and C. H. Daubendiek.

The early months of the year, according to Secretary Daubendiek, were fairly normal in a business way, but adverse conditions arose during the fall months. This in spite of the fact that wages in all departments were reduced and all expenditures were cut to a minimum.

A sleet damage south of Remsen and at West Bend and Anita during the last month of 1931 caused heavy expenditures, and as a result of sub-normal business conditions and property damages the usual 6 per cent dividend could not be paid.

Illinois Bell Above Dividend

Illinois Bell Telephone Co. Ended 1931 With Margin of Earnings Above Dividend Requirements and Net Station Loss of 56,541; Local Operating Improved—High Service Standards

While revenues of the Illinois Bell Telephone Co. for the year 1931, in common with those of most other industries, were adversely affected by general business conditions, the company was able to improve the quality of its service and, by careful management, finish the year with a margin of earnings above dividend requirements.

The annual report of the company to its stockholders issued for the directors by President F. O. Hale on February 1 shows net earnings for the year of $16,149,372, or at the rate of 5.58 per cent on the average book cost of the physical property, compared with 6.21 per cent for 1930. Net profits were $12,816,907, which is $8.54 per average share of capital stock outstanding and compares with $9.98 per average share for 1930.

The income statement for the year ended December 31, follows:

Telephone operating revenues		$89,275,758.00
Telephone Operating Expenses:		
Operation expenses	$32,494,598.67	
Current maintenance	15,618,816.22	
Depreciation	13,735,792.53	61,849,207.42
Net telephone operating revenue		$27,426,550.58
Uncollectible operating revenues		585,768.86
Taxes assignable to operations		10,243,427.00
Operating Income		$16,597,354.72
Net non-operating income		781,689.98
Gross Income		$17,379,044.70
Rent and miscellaneous deductions		1,229,672.55
Bond interest		2,448,586.52
Other interest		760,165.41
Debt discount and expense		123,713.41
Balance Net Income		$12,816,906.81
Dividend appropriations of income		12,000,000.00
Balance for corporate surplus		$ 816,906.81

The number of telephones connected was 227,575 and the number disconnected 284,116, resulting in a net station loss of 56,541. However, at the end of the year the total number of telephones in service was 15,000 higher than at the beginning of 1929 and about 175,000 higher than five years ago. In addition to connections and disconnections, 175,068 telephones were moved due to subscribers' change of address.

The company on December 31 had 1,388,234 stations of which 302,000 are dial operated. It also had 10,872 service and private line stations, and 343,117 connecting company stations.

Gross expenditures for additions and betterments during the year amounted to $20,273,845. The principal items were: Land and buildings, $760,684; switchboard and other equipment in telephone exchanges, $2,183,188; subscribers' station equipment, $10,654,845, and exchange and toll lines, $6,431,438.

Because of decreased activity in business in general, expenditures for new construction were not as large as those in previous years. In general, expenditures made were to advance or complete work already under way and to provide for the installation of service for new subscribers in locations not previously served.

The standard of the maintenance has been held at a high level, and as a result the plant is not only of sufficient capacity to care for some additional business at a minimum cost, but is also in excellent condition.

The daily average of local telephone calls was $5,891,000, a decrease of 4.4 per cent from 1930. Toll and long distance messages averaged 221,000 per day, a decrease of 6.1 per cent.

"It is fundamental in the policy of your company to make continuous effort to improve the service rendered to its customers," President Hale said. "Although the service was already of a high quality, our operating departments were able during 1931 to make still further improvements in such matters as the speed, accuracy, clearness of transmission and elimination of physical troubles.

Important among these improvements was a further reduction in the percentage of local calls affected by operating errors. The last few years have seen marked improvements in the speed of calls to distant points and the clearness of conversations over long distances. About 85 per cent of these calls are now completed without the calling party leaving the telephone.

Further improvements were also realized in handling the installation of telephones. During the year 90 per cent of all orders were handled on the appointment plan, whereby the subscriber specifies the day on which he wishes his telephone installed, an improvement of 10 per cent over the previous year.

Further extension of preventive maintenance assures decreased frequency of apparatus troubles. Under these measures trouble is anticipated and prevented rather than merely cleared after it occurs. In 1927 the prevailing average of troubles affecting service was once in 15 months on each telephone. By 1931 the average frequency of such troubles had been reduced to once in 24 months.

Special equipment was installed in the Evanston office whereby those subscribers who prefer to do so are now able to make calls to Chicago by dialing directly to Chicago numbers. This is, of course, a faster service."

"During the year your company further increased its activities designed to extend the use of its service and enlarged the commercial forces engaged directly in sales work," continued Mr. Hale in discussing sales activities. "Greater interest and personal activity in extending the use of our service have also been present throughout the entire employe group.

"Thousands of our employes have responded enthusiastically to the company's invitation to present the advantages of telephone service and greater telephone convenience to their relatives, neighbors, friends and associates. During the year employes' sales totaled more than 150,000 items, of which about 55,000 provided service for new customers not already connected.

During the year adjustments were made in charges for service connection and charges for moving telephones within subscribers' premises. In general, these adjustments resulted in a saving to customers and tend to stimulate the growth of the service."

"A thorough understanding of our operations, aims and policies tends to promote mutual confidence between the company and its customers," said Mr. Hale. "During the year we have continued our efforts to make these policies known to the public and obtain for them general recognition.

"Briefly stated, it is our fundamentl policy to furnish the most telephone service and the best at the least cost to our customers; to seek earnings sufficient only to operate the business on a sound financial basis with no large profits for distribution as 'melons'; to use any earnings in excess

of actual requirements to improve the service or reduce its cost; and to provide adequate compensation and suitable working conditions for employes.

Our business differs from the usual commercial enterprise. We do not manufacture or buy and sell commodities which move rapidly with resulting rapid turnover of capital. We sell a service, made to order a call at a time.

The cost of supplying this service is controlled by two principal items. One of these is the operating costs of rendering and maintaining the service. The other is the capital charges on a vast plant which, once installed, remains continuously in service for the use of the public and is continuously subject to these fixed charges.

Because of the great value of our service, both to the individual and the community, it has expanded rapidly within recent years, but because of the inherent characteristics of the telephone business this expansion has not been, and cannot be, attended by the economies of mass production customary in most industries. As the telephone system grows the plant and switching arrangements become more complicated, and the cost of giving each subscriber access to larger numbers of telephones increases.

But the benefits and economies resulting from continuous improvements made in methods and equipment partially offset these rising costs and help avoid the necessity of increasing charges for service. In this respect we are aided materially by the systematic efforts of the Bell Telephone Laboratories to design better and cheaper equipment, by the studies of the American Telephone & Telegraph Co. for the purpose of devising more efficient operating methods, and by the work of the Western Electric Co. in producing high grade apparatus at the least cost. All these have been of great value in offsetting the inherent tendency toward constantly rising costs of operation."

Teletypewriter switching service was inaugurated on November 21. By the end of the year 400 business firms in the Illinois Bell territory had subscribed for the service.

Directors of the company are: W. Rufus Abbott, chairman, Chicago; William Butterworth, Moline; D. Mark Cummings, Floyd O. Hale, Charles Piez, Theo. W. Robinson, Fred W. Sargent and Bernard E. Sunny, Chicago; Charles P. Cooper and Walter S. Gifford, New York.

Mutual Company in Missouri Holds 30th Annual Meeting.

There were about 200 present at the 30th annual meeting of the Andrew County Mutual Telephone Co. held in Savannah, Mo., late in January. Five directors—G. C. Lincoln, Grover Duff, C. E. Caldwell, J. G. Thorburn, Elias Wrigley—were reelected and they elected G. C. Lincoln, president; C. E. Caldwell, vice-president; Elias Wrigley, treasurer, and Miss Nellie Wampler, secretary. Miss Wampler has been employed in the office of the company for seven years.

The financial reports showed assets to be: Fixed capital, $80,704.19; construction work in progress, $32.80; cash in bank, $438.87; employes' working fund, $30.00; due from subscribers and agents, $2,087.49; due from subscribers and agents, "sub. accounts," $648.22; miscellaneous accounts, receivable pin rent, $220.42; material and supplies, $5,253.68; prepaid insurance, $253.55; other prepayments, $2,235.90; other expenses, $49.60; bank failures, $1,747.54; total assets, $93,702.26.

Liabilities: Common stock, $34,480.00; advances from system corporations, $9,850.00; notes payable, $1,965.34; audited vouchers, $3,746.38; taxes accrued, $85.41; reserve for accrued depreciation, $15,573.89; reserve for uncollectible, $52.19; corporate surplus, $27,949.05; total liabilities, $93,702.26.

The statement of revenues and expenses for the year ending December 31, 1931, is as follows:

Revenues: Subscriber station revenue, $19,871.13; service station revenue, $9,394.10; minor rents of exchange plant, $551.88; message toll revenue, $3,066.90; telegraph commissions, $13.05; rents from other operating property, $275.00; other miscellaneous revenue, $16.08; total revenue, $33,188.14.

Expenses: Maintenance, $5,921.92; traffic expense $14,075.70, of which $12,689.95 were in operators' wages and $803.41 for transmission power; commercial expenses totaled $4,412.48 of which administration was $509.32; accounting $1,754.39 and collecting $2,118.72; general and miscellaneous expenses totaled $2,735.85 which included $1,330 salaries of general office clerks.

Miscellaneous deductions were: Uncollectible operating revenue, $384.00; taxes assignable to operations, $839.63; rent for telephone offices, $438.00; rent for poles, etc., $4.00; miscellaneous rent deduction, $15.00; total deductions, $1,680.63.

Total expense and deductions amounted to $28,826.58 and gross income before depreciation was $4,361.56. Depreciation expense at 4 per cent of property and plant came to $3,228.00, leaving a net income of $1,133.56.

The Andrew County Mutual Telephone Co. operates about 2,700 telephones from 12 exchanges, the largest of 992 common battery telephones being at Savannah, Mo.

Statistics of Illinois Bell Company, December 31, 1931

Number of Stations:	
Company	1,388,234
Service and private line	10,872
Connecting company	343,117
Total stations	1,742,223
Number of Central Offices:	
Company	293
Connecting company	871
Total central offices	1,164
Number of private branch exchanges	13,658
Number of connecting companies	433
Number of Miles of Wire:	
Aerial, in cable	1,180,450
Other	170,985
Underground, in cable	5,088,589
Total miles of wire	6,440,024
Number of miles of pole lines	19,595
Number of miles of underground, duct	10,219
Subway	1,805
Number of employes, male	9,052
Female	17,438
Total employes	26,490
Total payroll expenditures for year	$41,785,221

A. T. & T. Directors Declare Regular Quarterly Dividend.

The directors of the American Telephone & Telegraph Co. on February 17 declared the regular quarterly dividend of $2.25 a share, payable on April 15 to stockholders of record of March 12. There are more than 645,000 stockholders owning 18,658,361 shares of stock.

Although final 1931 earning figures have not yet been published, the company fully covered its $9 a share dividend requirement.

Second in importance only to the question of maintaining existing wage scales, it was said that directors of the company hold as a policy maintaining dividend payments at the present scale.

It was announced that W. Cameron Forbes, retiring United States Ambassador to Japan, was elected to the board of directors. Mr. Forbes resigned as a director of the company to become Ambassador to Japan last June. He succeeds Jeremiah Smith, who was delegated by the league of nations in 1924 to direct the financial reconstruction of Hungary. Mr. Smith is retiring from the board, it was stated, on account of his health.

Issue of Bonds of Ohio Associated Telephone Co.

An issue of $1,770,000 Ohio Associated Telephone Co. first mortgage 6 per cent bonds, series A, due January 1, 1962, was offered in late January by Bonbright & Co., Chicago, at 82, to yield over 7.50 per cent.

The company, a part of the Associated Telephone Utilities group, operates the exchanges of the system in Ohio, having 26,355 telephones in 94 communities. Earnings in the 12 months ended November 30, 1931, available for interest before depreciation were said to be more than 3.5 times annual interest requirements while earn-

ings after depreciation in the same period were 2.7 times interest requirements.

Proceeds of the financing will be used to pay for properties acquired, for retirement of bonds outstanding and for other corporate purposes.

Some Financial Results of 1931 Operations Briefly Told.

The ten Bell companies which have issued their annual reports show total dividend declarations of $72,198,565 for 1931, comparing with dividend declarations of $65,700,701 in 1930, an increase of 9.9 per cent.

The surplus remaining after these dividend declarations in 1931 aggregated $3,572,541, comparing with a surplus after dividends of $7,789,835 in 1930, a decline of 54.1 per cent.

Eight of the companies showed surpluses after dividends in both years, and two showed deficits in both years.

The New Jersey Bell Telephone Co. declared dividends of $8,831,615 in 1931, against $8,031,616 in 1930, and reported a deficit of $367,458, against $119,723 in 1930. The Michigan Bell Telephone Co. paid $4,400,000 in dividends in 1931, against $5,000,000 in 1930, and showed a deficit of $469,981, against a deficit of $1,442,318 in 1930.

The Pacific Telephone & Telegraph Co. paid $17,555,000 dividends in 1931 and carried $1,252,575 to surplus, comparing with $15,973,033 dividends and $1,679,323 surplus in 1930. The Illinois Bell Telephone Co. paid $12,000,000 dividends and had $816,907 surplus in 1931, against $10,400,000 and $2,571,590, respectively, in 1930.

The New England Telephone & Telegraph Co. paid $10,661,518 dividends and carried $1,013,707 to surplus, comparing with $9,954,331 and $1,477,692, respectively, the year before. The Bell Telephone Co. of Pa. paid $8,800,000 dividends, against $7,200,000 in 1930, and carried $812,822 to surplus, against $2,001,810 surplus in 1930. The Mountain States Telephone & Telegraph Co. paid $3,843,976 dividends, against $3,722,538, and had $4,224 surplus, against $793,343.

The Southern New England Telephone Co. paid $3,200,000 dividends, against $2,900,000, and had $329,454 surplus, against $511,331. The Cincinnati & Suburban Bell Telephone Co. paid $2,473,956 dividends, against $2,226,683 in 1930, and had $138,138 surplus, against $240,789. The Diamond State Telephone Co. paid $432,500 dividends, against $292,500, and had $42,153 surplus remaining, against $75,998 in 1930.

The ability of the Bell System companies to compensate for moderately low gross revenues by effecting economies in the operation of their plant is reflected, as indicated by the foregoing figures by the declaration of substantially larger dividends for 1931 than in 1930, resulting in deficits in only a few cases.

A group of 11 Independent companies reported to the Interstate Commerce Commission aggregate operating revenues of $28,297,378 for 1931, a decline of 1.97 per cent from the $28,867,122 reported for 1930, and net operating income of $7,900,863 in 1930, a decline of 1.50 per cent.

Earnings statements of some of the larger companies reporting to the Interstate Commerce Commission follow:

Illinois Bell Telephone Co.

	1931.	1930.
December gross	$7,425,655	$7,804,670
Net earnings	1,326,726	1,382,531
12 months' gross	89,275,758	92,742,142
Net earnings	16,597,355	17,571,747

Michigan Bell Telephone Co.

December gross	$3,074,114	$3,387,241
Net earnings	300,634	478,192
12 months' gross	38,831,493	41,502,997
Net earnings	6,647,044	6,283,858

Wisconsin Telephone Co.

December gross	$1,444,067	$1,480,258
Net earnings	216,174	199,105
12 months' gross	17,831,244	18,186,368
Net earnings	3,066,932	3,151,270

Home Telephone & Telegraph Co. Fort Wayne, Ind.

December gross	$ 106,700	$ 114,190
Net earnings	40,620	22,726
12 months' gross	1,316,272	1,360,216
Net earnings	343,255	249,329

Ohio Bell Telephone Co.

December gross	$3,499,474	$3,709,524
Net earnings	712,010	791,310
12 months' gross	42,818,708	44,264,952
Net earnings	9,260,110	9,341,098

Pacific Telephone & Telegraph Co. Excluding Subsidiaries.

December gross	$5,110,011	$5,374,270
Net earnings	971,850	1,244,128
12 months' gross	62,641,505	69,881,646
Net earnings	13,583,709	15,161,296

Tri-State Telephone & Telegraph Co., St. Paul, Minn.

December gross	$ 466,296	$ 484,250
Net earnings	112,536	53,923
12 months' gross	5,742,265	5,840,207
Net earnings	1,512,764	1,471,688

Southern California Telephone Co.

December gross	$3,351,311	$3,489,113
Net earnings	853,859	922,426
12 months' gross	39,949,677	35,369,471
Net earnings	10,437,780	8,888,938

Associated Telephone Co., Ltd., Los Angeles, Calif.

December gross	$ 212,602	$ 220,470
Net earnings	77,065	107,967
12 months' gross	2,609,470	2,545,131
Net earnings	1,020,335	1,009,282

New England Telephone & Telegraph Co.

December gross	$6,355,494	$6,388,896
Net earnings	1,358,542	1,390,489
12 months' gross	75,420,021	75,328,203
Net earnings	17,545,389	16,866,618

Rochester (N. Y.) Telephone Corp.

December gross	$ 452,143	$ 445,406
Net earnings	77,527	83,033
12 months' gross	5,375,326	5,348,709
Net earnings	1,189,393	1,214,445

Mutual Telephone Co. (Hawaii)

December gross	$ 137,941	$ 128,207
Net earnings	36,870	24,806
12 months' gross	1,564,891	1,513,608
Net earnings	373,960	394,204

Southern Bell T. & T. Co.

	1932.	1931.
January gross	$4,656,373	$5,067,873
Net earnings	1,055,103	1,197,641

Dakota Central Telephone Co., Aberdeen, S. D.

January gross	$ 119,570	$ 127,079
Net earnings	30,510	21,315

Current Price Quotations on Listed Telephone Stocks.

February 20, 1932.

	High.	Low.	Last.
American Telephone & Telegraph Co.	137⅜	126¾	129⅝
Associated Telephone & Telegraph Co., A	52½	49½	52½
Associated Telephone & Telegraph Co., 6% pfd.	65	62½	65
Associated Telephone & Telegraph, 7% pfd.	76	74½	76
Associated Telephone Utilities Co.	6	6	6
Associated Telephone Utilities Co., A	20	20	20
Associated Telephone Utilities Co., 6% pfd.	25	25	25
Associated Telephone Utilities Co., 7% pfd.	30	30	30
Bell Telephone Co. of Pennsylvania	111½	111½	111½
Cincinnati & Suburban Bell Telephone Co.	65	65	65
International Telephone & Telegraph Corp.	12¼	10	11
New England Telephone & Telegraph Co.	111	109	109
New York Telephone Co., 6½% pfd.	113	113	113
Pacific Telephone & Telegraph Co.	101⅞	97	97
Pacific Telephone & Telegraph Co., pfd.	109	106½	106½
Southwestern Bell Telephone Co., pfd.	110½	110½	110½
Telephone Bond & Share Co., pfd.	90	88⅛	88½
Western Power, Light & Telephone Co.	5½	5½	5½
Western Power, Light & Telephone Co., pfd.	36	34½	36

BID AND ASKED QUOTATIONS.

	Bid. Feb. 20.	Asked. Feb. 19.	Bid.
Community Telephone Co.	4	9	..
Lincoln Telephone & Telegraph Co.	110	...	110
Middle Western Telephone Co.	..	20½	..
Mountain States Telephone & Telegraph Co.	109	112	113
National Telephone & Telegraph Corp., A	55	...	55
Northwestern Bell Telephone Co., pfd. (6.50)	104	107	104
Peninsular Telephone Co., $1.40	14	20	14
Peninsular Telephone Co., pfd., A, 7	84	87	84
Porto Rico Telephone Co.	65	..	65
Rochester Telephone Corp., 1st pfd.	99	101	100
Southern New England Telephone Co., 8	120	123	121
Telephone Bond & Share Co., A	36	42	..
Wisconsin Telephone C., pfd.	107	110	107

Pacific Bell Company Shows Deficit for Last Quarter.

The Pacific Telephone & Telegraph Co. and its associated companies report telephone operating revenues for the last quarter of 1931 amounting to $25,858,251. This compares with $27,020,788 for the same period in 1930. The net income for the last quarter amounted to $4,283,220 in comparison with $4,902,430 in the same period last year. The last quarter of 1931 shows a deficit of $105,530.

For the 12 months ending December 31, 1931, net income amounted to $18,807,575, equivalent to $7.69 a share of common stock, as against $17,669,383 in the year 1930, which was equivalent to $8.06 on the average number of shares outstanding.

Up-to-Date Equipment at Medina, Ohio

Northern Ohio Telephone Co. Moves Exchange Headquarters at Medina, Ohio, Into Remodeled Residence and Installs New Equipment, Including Six-Position Switchboard—Overhead Lines Removed, Underground Cable System Laid

By J. C. Snyder,
Sales Engineer, Stromberg-Carlson Telephone Mfg. Co.

Close to four-score telephone men and women gathered in Medina, Ohio, when the cut-over to a new telephone system was made by the Northern Ohio Telephone Co. The ceremony was staged just before 11 p. m., after which there was a luncheon served in the basement of the new telephone exchange building.

The cut-over was executed without any difficulty or trouble, and the officials of the Northern Ohio company were complimented for the manner in which they switched over to the modern and up-to-date telephone system.

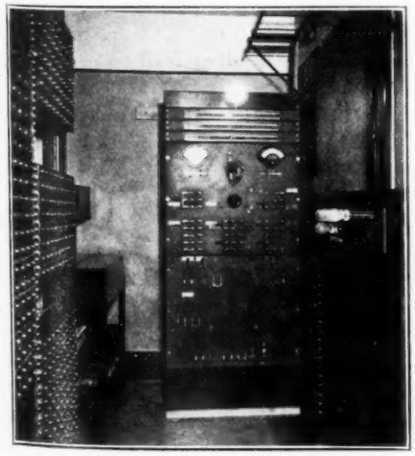
The company moved its exchange headquarters from the Odd Fellows Temple to its new quarters, a remodeled residence. On the first floor of the exchange building are a handsome entrance hallway; commercial office in which customers may talk directly across counters to the clerks without having to converse through bars, as is the case in many telephone offices; a well-appointed manager's office, spacious operating room, lounging room for operators with a private door leading to the street.

The basement includes a large workroom and furnace and battery rooms. A building serving as a three-car garage, workroom and storage room, is located at the rear of the office.

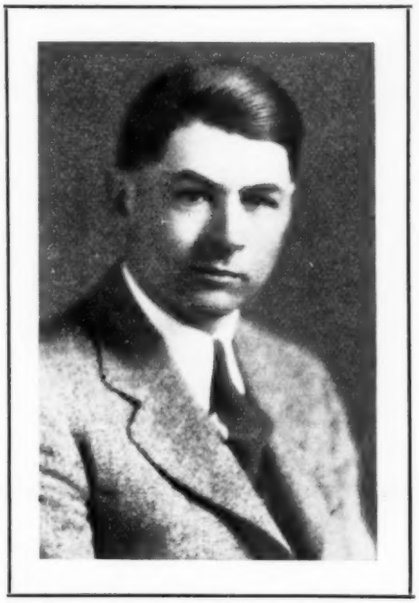
In connection with the new exchange all overhead lines have been removed and an underground cable system has been laid. The total cost of the improvements including buildings, underground lines and equipment was $50,000.

With its new telephone home in Medina the Northern Ohio company has its own buildings in 14 of the 41 cities in which it operates. Another step in the plan of W. C. Henry, general manager of the company, is to have all the exchanges in the company system on ground floors.

In the new exchange, Mr. Henry made an innovation which he believes will bring to the Medina public a better understanding of the operation of the telephone exchange. Glass partitions between the commercial office and the operating room make it possible for customers to view the operators at work at the new switchboard.



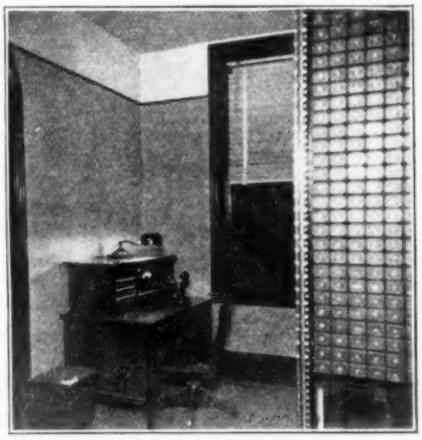
View of Terminal Room at Medina, Ohio, Showing Line and Cord Circuit Relays Mounted on Frames.



Wm. C. Henry, of Bellevue, Ohio, General Manager of the Northern Ohio Telephone Co., Advocates the Placing of All Exchanges in the Company's System on Ground Floors.

The six positions of the Stromberg-Carlson super-service switchboard consist of two toll, one universal and three local positions. Each toll position is equipped with 12 high-efficiency toll combination cords arranged for 48-volt transmission.

The rural position is equipped with 17 full-feature universal cords, and each local position is equipped with 17 super-service cords. The local and rural positions are equipped with the well-known master key ringing equipment developed and perfected by the Stromberg-Carlson company. The Medina board is arranged for five-party ringing and this master key arrangement cuts the number of ringing keys in each position from 85 to 5. With such an arrangement it is obvious that an operator can handle a considerably greater load without fatigue than with the old method.



Wire Chief's Desk at Medina, Ohio, Where New Equipment Was Recently Installed.

All toll lines in the board are lamp-ended and arranged to faithfully indicate code rings. The rural lines are all common-battery lamp-signal type and equipped with two jacks per line to simplify 10-party ringing on these lines.

The local lines employ the use of the well-known Stromberg-Carlson 200 type line and cut-off relays. The line lamps are associated with the multiple jacks and distributed throughout the switchboard in a five-panel arrangement. This provides for equal load distribution for the operators, speedier service to the subscribers, and economy in operation because greater loads are handled by all operators.

All line and cord circuit relays are mounted on frames in the terminal room. This arrangement not only allows the rear of the sections to be almost void of equipment but also places all cord and line circuit relays in an accessible position.

All cord circuits are assembled on individual circuit plates, one circuit per plate. A complete cord circuit may be removed for inspection or test by the loosening of a few screws, making the use of a soldering iron unnecessary.

The main booster and noise-killing batteries are located in a special battery room in the basement, and all wires between the batteries and the large power board are enclosed in conduits. Charging current is obtained from a 20-ampere diverter pole motor generator of the latest and most approved type.

The old Medina Telephone Co. was organized in 1898 by F. H. Leach, presi-

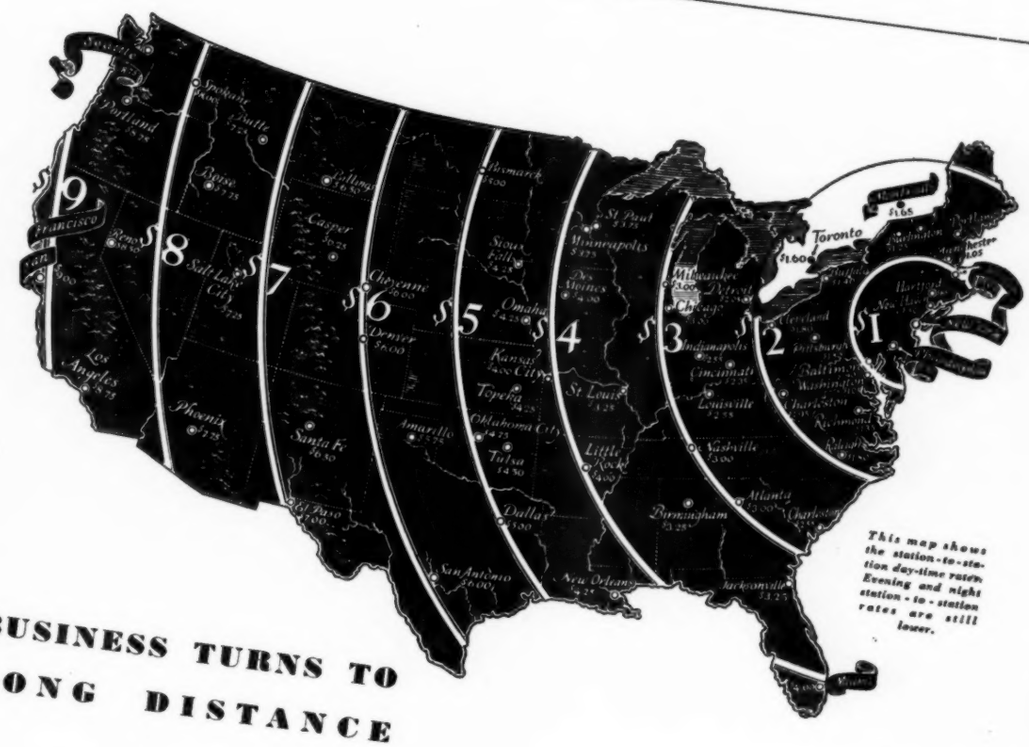
LONG DISTANCE ADVERTISING tuned to the times

WITH one trying year just completed, business in 1932 will take advantage of every sensible means to broaden profit margins. Sales costs and other overhead *must* be kept in line. How?

The timely advertisement on the opposite page points one way — through Long Distance service. It explains how Long Distance can be profitably employed in almost any phase of production and distribution — in ordering materials, announcing price changes, arranging deliveries, cont customers and prospects. It emphasizes the nite advantages of a telephone plan custom tai to the individual business. Its illustration pro visual, factual proof of economy.

Appearing during January and Febru national publications, and accurately aimed objective, this advertisement should benef entire telephone industry.

An Advertisement of the American Telephone and Telegraph Comp



BUSINESS TURNS TO LONG DISTANCE FOR ECONOMY

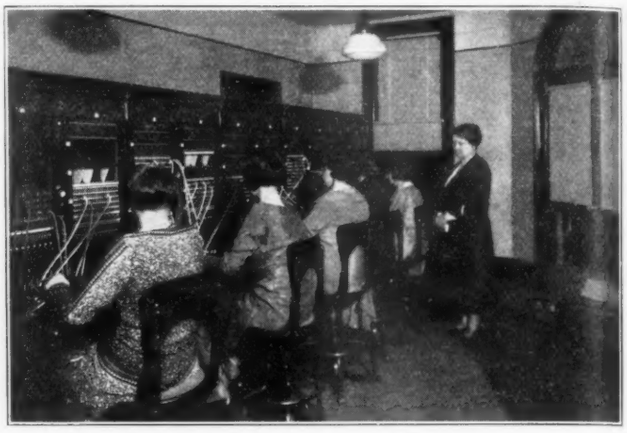
MANY companies are meeting today's difficult production and distribution problems by using long distance telephone service for transacting their out-of-town business. This method of contacting customers and prospects is quick. It gets results. It effects savings in many ways. It is a profitable investment.

The telephone saves valuable time in starting production, making deliveries, announcing price changes, ordering supplies, arranging appointments. It conserves hours for busy executives, letting them accomplish more.

And Long Distance rates are low. You can conduct business with a man many miles away . . . with the advantages of a face-to-face conversation . . . at a surprisingly small cost. There are two kinds of out-of-town calls: *person-to-person*, when you wish to talk with a specific person; and *station-to-station*, when you will talk with any one who answers the called telephone. The latter are cheaper.

Many business men have found that a definite plan of telephoning helps them build business and cut costs. An experienced telephone representative will gladly study your problems, and develop a plan that is custom-made for your company. There is no charge for this advisory service.

JUST CALL YOUR BELL TELEPHONE BUSINESS OFFICE



Attractive Commercial Office in Building of the Northern Ohio Telephone Co., at Medina, Ohio—New Switchboard Installed Consists of Two Toll, One Universal and Three Local Positions.

dent; Dr. W. B. Croft, secretary; B. Henderson, treasurer, and A. L. Buckingham, manager. These men operated the company until 1910 when A. D. Aylord and H. E. Aylord purchased it. At that time the company had 850 subscribers, and when the Aylords sold it to the Northern Ohio Telephone company in 1926 it had 1,800 subscribers.

The company is still operated by the Northern Ohio Telephone Co., of which W. C. Henry is general manager. Ernest Favri is manager of the Medina exchange.

Medina has a population of 4,200 and is the county seat of Medina. It is 28 miles southwest of Cleveland, on two main highways. It is the home of two well-known manufacturing companies, the A. I. Root Co. and the Moncrief Furnace Co. The story of the beginning of the Root company is quite unusual.

Sixty-three years ago A. I. Root offered a fellow workman a dollar for a swarm of bees passing overhead. In a few minutes he was astonished to find himself the owner of the bees, and from this incident an industry was born. In 1869, in the little shop where Root manufactured jewelry, he experimentally learned what was best in equipment for bee culture and then produced it for other beekeepers.

Since that time the A. I. Root Co. has progressed steadily into a position of financial strength and leadership in this field, manufacturing more than 200 articles for beekeepers, marketing Airline honey and thousands of pounds of bees each year, and, in addition, publishing authoritative text-books and journals on related subjects.

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Federal Court Rules in Indiana Rate Reduction Order.

Perhaps the most important decision, establishing the principle of public utility rate making which provides that only property of immediate usefulness in serving a community, rather than the entire system of a company serving numerous communities, shall be counted in the valuation on which rates are based, has been upheld in the federal court in Indianapolis, Ind. While the decision affected an electric utility, it is of prime importance to telephone utilities also.

A three-judge court dismissed a temporary injunction which an Insull utility had obtained to prevent the Indiana Public Service Commission from entering a reduction in rates in the city of Martinsville.

The opinion denied the view of the Wabash Valley Electric Co. that its entire property be used as a basis for rates in Martinsville. It pointed out that the company received more than 7 per cent return on the property "used and useful" in supplying service to Martinsville and denied that the lower schedule of rates was confiscatory. The order likewise provided for the return to Martinsville consumers of all sums of money collected in excess of those which the company would have collected under the schedule of rates in the disputed order.

Frank T. Singleton, member of the Indiana commission, declared that the court decision is one of the most important utility decisions ever handed down by a court.

Attorneys for the utility would not state whether they would appeal the case to the circuit court of appeals in Chicago.

The decision will have, of course, weight with the commission in making findings in future cases. The commission recently adopted an order establishing emergency rate reductions, but the order provided any city could appeal to the commission, if it were part of the general system, with a separate rate case.

Oklahoma's Tax Suit Against Southwestern Bell Settled.

Settlement of Governor Murray's tax suit case against the Southwestern Bell Telephone Co. in Oklahoma was completed on February 10 following payment by the company of $44,795.94 to the state treasury.

The amount represented fees alleged due on increased capital since 1920, plus 6 per cent interest yearly.

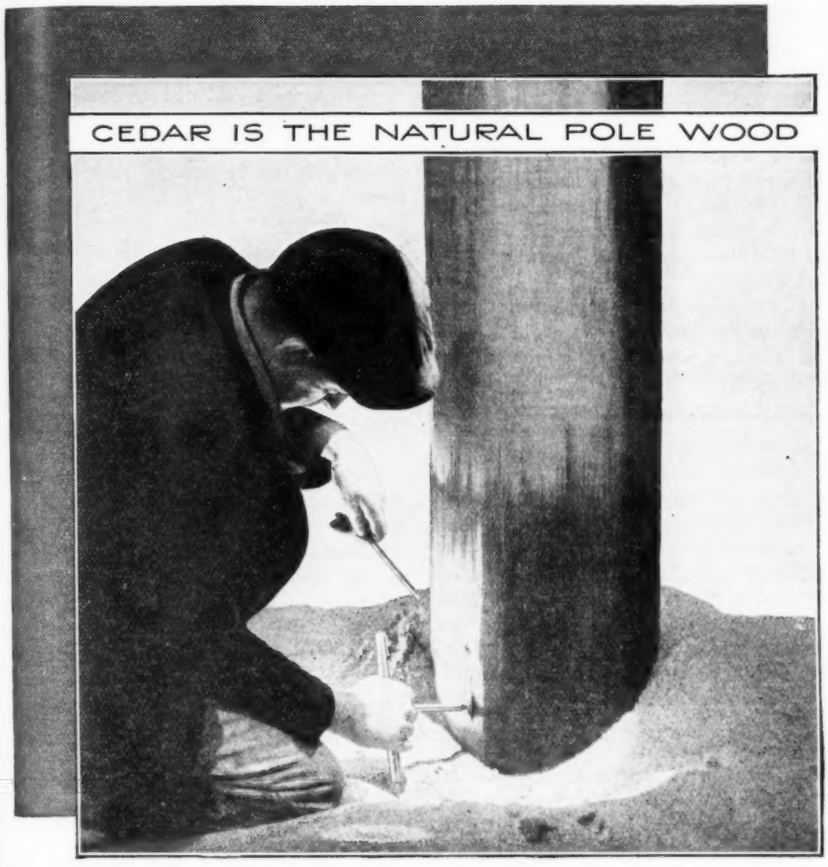
Governor Murray had filed suit for $644,000, of which approximately $600,000 penalties was asked. Attorney General King said the payment "was a fair settlement for all concerned."

Boston Labor Union Files Complaint on Securities Issued.

Wycliffe C. Marshall, attorney for the Boston Central Labor Union in its petition for a reduction of telephone rates of the New England Telephone & Telegraph Co., has filed a complaint with the securities division of the Massachusetts Department of Public Utilities that the sale in the state of Massachusetts of the common stock and bonds of the New England company of New York would be fraudulent or would be likely to result in fraud on two grounds:

1. The New England Telephone & Telegraph Co. is not a de facto corporation with power to issue securities.

2. That the securities issued since 1894 have been issued without the approval of



P&H

"Still in the Lead"

Field Tests Show What You May Expect from P & H PROCESS Poles

IN 1921, the first line of "P & H PROCESS" poles was put under test in Minnesota . . . other lines followed in Kansas, New Jersey, New York, Massachusetts, New Hampshire. Wide variation in soil and climatic conditions thus afforded a real test of "P & H PROCESS" poles in actual service.

Periodic inspections revealed the groundline of every pole inspected as sound as the day it was set. Fungus was unable to grow on the borings taken from Line No. 1 after eleven years of service . . . positive proof that the free creosote in the poles was still protecting them against decay.

These tests show conclusively that the added pole life in excess of the natural life of the pole follows closely the amount of creosote in pounds per cubic foot of sapwood throughout the groundline area.

The P & H double guarantee of at least 36 pounds guaranteed sapwood saturation and one-half inch penetration assures maximum pole life at lowest per annum cost.

Whatever your Cedar pole requirements may be . . . in Northern White Cedar or Western Red Cedar . . . we are ready to supply them promptly.

NEW YORK, N. Y., 50 Church Street
BOSTON, MASS., 733 Public Service Bldg.
PITTSBURGH, PA., 1210 Grant Bldg.
DAYTON, OHIO, 854 Reibold Bldg.
CHICAGO, ILL., 20 No. Wacker Drive Bldg.
KANSAS CITY, MO., 2300 Power & Light Bldg.
OMAHA, NEB., 711 Electric Building

PAGE AND HILL CO.
MINNEAPOLIS, MINN.

public officials of Massachusetts as required by the state laws and are in violation of these laws.

The total value of securities affected amounts to approximately $221,000,000, it was stated.

Claims Securities of New England Bell Null and Void.

Alleging that $2,800,000 worth of telephone securities are null and void because of violations of the Massachusetts telephone laws, Wycliffe C. Marshall filed a statement and balance sheet with the Massachusetts Department of Public Utilities at a hearing on February 17. Mr. Marshall is attorney for the Boston Central Labor Union and the Massachusetts state branch of the American Federation of Labor which are petitioning for a reduction in rates of the New England Telephone & Telegraph Co. Hearings have been in progress for about a year, but have been continued from time to time with several weeks' interval between them.

According to Mr. Marshall, all of the securities ($221,022,900) of the New England Telephone & Telegraph Co. (of New York) and 99 per cent of the securities $2,605,361,538) of the American Telephone & Telegraph Co. (of New York) are null and void.

"The practical result in the present telephone rate case," he stated, "is that there is no lawful base of invested property upon which a reasonable rate of return can be determined for telephone service in Massachusetts by the Massachusetts Department of Public Utilities. The two attached balance sheets of the companies show the investment details and reference to the Massachusetts laws now violated. The New England company has no power to contract in regard to any business matters, and, therefore, cannot lawfully file any binding rates with the Massachusetts Department of Public Utilities."

In 1883, four Massachusetts, two New Hampshire, and one Maine telephone companies attempted to form through a consolidation the New England Telephone & Telegraph Co. (of New York). Subsequently, 10 other Massachusetts telephone companies consolidated with the New England company. None of these consolidations, Mr. Marshall declares, was predicated on statutory or other specific laws of Massachusetts.

"In 1900," he continued, "the American Bell Telephone Co., a Massachusetts corporation, in spite of legislative prohibition, 'consolidated' with the American Telephone & Telegraph Co. (of New York) to form the present American Telephone & Telegraph Co.

"In each case, all the property, effects, assets, corporate rights and franchises of every kind were transferred from the Massachusetts companies to the 'consolidated' corporation, and the stockholders of the constituent companies were combined into one group by the exchange of capital stock of the 'consolidated' company for the stock of the constituent companies.

The merged Massachusetts companies were thus left without property, corporate rights, franchises, and stockholders; all have been transferred bodily to the consolidation. The constituent corporations were dissolved; but their franchises, privileges, rights, and properties continued their existence, to be enjoyed and exercised by the new, or enlarged, or reorganized corporate entity with combined stockholders."

"Control of the capital structure of the telephone company by Massachusetts means control of the rate base," Mr. Marshall's statement continues, after discussion of consolidations.

"The scope of control is that the New England and the American telephone companies shall issue only such amounts as from time to time, upon investigation after application by the corporation, may be deemed by the public body (now the D. P. U.) to be reasonably necessary for the purposes for which such issues of securities have been authorized and approved as such by the public body. And the New England and the American telephone companies shall not apply the proceeds of such issues to any purpose not specified in the certificate of approval filed by the Massachusetts regulatory body.

The above Massachusetts legislation is such an amendment to the charters of the constituent Massachusetts telephone corporations in the two consolidations, that the entire capital structure of the New England Telephone & Telegraph Co. (of New York) and of the American Telephone & Telegraph Co. (of New York), by reason of the constituent Massachusetts corporations therein, is subject to the provisions of the Massachusetts securities law, and has been since the year 1894.

This is the effect on the New England Telephone & Telegraph Co. (of New York) and the American Telephone & Telegraph Co. (of New York) of issuing securities in violation of the above statute:

1. The action of the corporation in fixing the issue of capital stock or other securities is wholly void.

Answers to the Traffic Questions Presented on Page 21.

1. The subscriber's line may be held 10 minutes.

2. The calling party in this case specified a particular operator, making the call subject to the person-to-person rate.

3. By taking a real interest in the work and by following standard operating practices.

4. Yes. We enter the passed time in the space for reports.

5. If word was not left on the call the classification of the call does not change.

2. The certificates issued therefor are void.

3. The money paid in by the subscribers or purchasers is paid without consideration.

4. The money paid in by the subscribers or purchasers is not assets of the corporation which can be used by it in its business.

5. The money so paid in does not represent an issue of capital stock or other securities.

6. It is in the nature of an unsecured loan, not a corporate security.

7. There is no capitalization and, therefore, no taxable franchise."

Telephone Rate Inquiry Restricted in St. Paul, Minnesota.

Lack of funds has caused the Minnesota Railroad & Warehouse Commission to confine its investigation of the rates of the Tri-State Telephone & Telegraph Co. to the St. Paul area instead of covering all of the cities served, according to a recent announcement by the commission.

A general investigation and valuation of the entire system had been planned. Hearings on the St. Paul investigation are scheduled to begin April 5.

New York Bell Takes Over Stock-Owned Companies.

On February 17, 1932, the Northern New York Telephone Co., of Plattsburgh; the Granville Telephone Co., Granville; the Otsego & Delaware Telephone Co., Oneonta; the Wayne Telephone Co., Wayne; the Alleghany County Telephone Co., Wellsville; and the Cattaraugus Union Telephone Co., Little Valley, were merged with the New York Telephone Co., according to an announcement by President J. S. McCulloh of the New York Telephone Co. on February 19.

All of the stock of these companies has been owned for some time by the New York Telephone Co. The New York company participated in the management of the merged companies in an advisory capacity on engineering, operating, financial and management questions and were represented on their boards of directors.

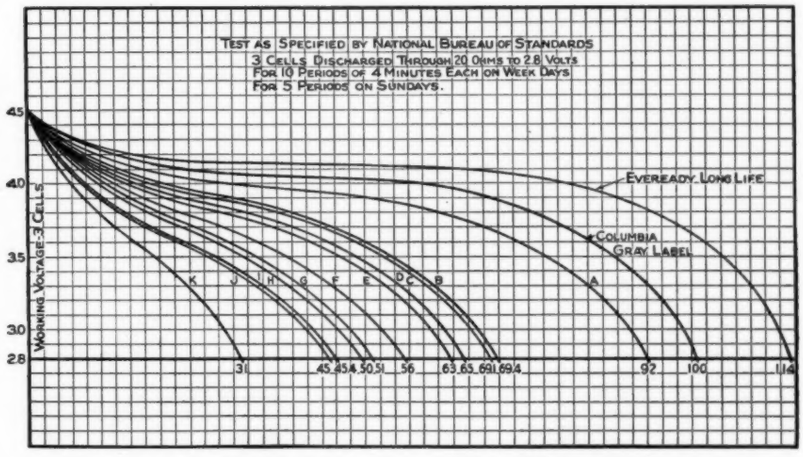
"The equipment, methods and practices of these companies were similar to those of the New York Telephone Co. and little or no change will be made in these respects or in the personnel," said Mr. McCulloh.

The merger will add about 56,500 telephones to those direcly operated by the New York Telephone Co.

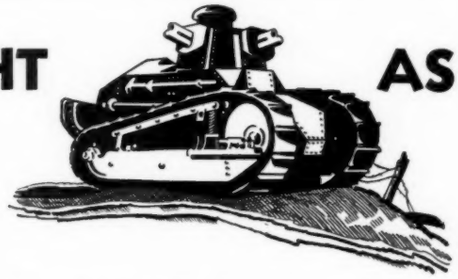
Directory Printed for Advertising Permanently Enjoined.

On December 28 the United States District Court at Cincinnati, Ohio, granted the Cincinnati & Suburban Bell Telephone Co. a permanent injunction against publishers of a classified telephone directory, which used subject matter of the company's directory.

The telephone company published sum-


TEST AS SPECIFIED BY NATIONAL BUREAU OF STANDARDS
3 CELLS DISCHARGED THROUGH 20 OHMS TO 2.8 VOLTS
FOR 10 PERIODS OF 4 MINUTES EACH ON WEEK DAYS
FOR 5 PERIODS ON SUNDAYS.
WORKING VOLTAGE-3 CELLS
45
40
35
30
28
EVEREADY LONG LIFE
COLUMBIA GRAY LABEL
K J I H G F E D C B A
31 45 45.4 50.5 56 63 65 69 69.4 92 100 114

Day's life on Standard Light Intermittent Test is expressed in percentages based on Columbia Gray Label as 100%. The Eveready long life Battery shows 114% or plus service, but also carries a higher price.

TIGHT  AS AN ARMORED TANK

THE chart shows how Columbia Gray Label Telephone Batteries — specifically made for telephone use and built to meet typical telephone service conditions — last longer and assure economy.

Battery-energy sealed in Columbias stays put until needed for action in rigorous telephone service.

With the new metal-seal top, the greatest battery-improvement in years, the power-giving elements of Columbias are now *completely* surrounded by metal. With this new, all-armored construction, there's no chance for battery-energy escaping through the top.

The zinc containers used for Columbia Telephone Batteries are not punched or stretched. Instead, the walls are made of rolled sheet zinc to which the bottom is securely soldered. That means freedom from thin spots and wall leaks. And the new metal top is absolutely crack-proof, preventing leakage and waste through cracked tops.

Leak-proof, crack-proof, bulge-proof — Columbia Gray Label Telephone Batteries are built to earn an extra service stripe. They give you more for your money and keep you happier while they're doing it.

For true economy and ever-reliable telephone use put them in your circuits.

Columbia Telephone Batteries *–they last longer*

NATIONAL CARBON COMPANY, INC.
General Offices: New York, N. Y.
Branches: Chicago Kansas City New York San Francisco

Unit of Union Carbide UCC *and Carbon Corporation*

mer and winter editions of its directory, each edition being copyrighted. There was also published with it a classified section prepared and copyrighted by another; and the telephone company shared in the proceeds derived from the advertisements.

It was alleged that the defendants issued and distributed what was known as a classified directory of certain named towns, including therein without the telephone company's permission the alphabetical portions of its copyrighted books, even including certain mistakes contained therein.

The subject-matter of the plaintiff's telephone books was obtained from original sources of information, whereas the defendants' books, except the advertising portion, were merely copied from the plaintiff's copyrighted book, so that the defendants thus obtained the benefit of the plaintiff's labor, skill, and expense.

The defendants issued the infringing books for the purpose of selling advertisements contained therein; and it was shown that the issuances of these books, containing erroneous telephone numbers, put an extra burden and expense on the telephone company and hampered and impeded its service to its own detriment and to the detriment and disadvantage of the public.

In granting a temporary injunction on October 8, 1930, Judge Nevin said:

"Whether or not, strictly speaking, the telephone company is entitled, under the strict rules of copyright law, to this injunction, I am not going to pass on at this time. I think there is somebody else interested in this proceeding; that is, the public. It has been stated that the telephone company is a quasi public corporation.

The telephone has ceased to be a luxury and has become a necessity in all business houses and in substantially all homes; everybody who can afford it has a telephone. Therefore, to get out a list of this kind and represent that it is an accurate list of the numbers in the telephone book, no doubt, does lead to confusion and results in extra maintenance cost that has been referred to by the officers of the company.

It is just that much more expense that every subscriber has to pay for the maintenance of his telephone service, and if books like these issued by defendants continued to be gotten out, more operators would have to be employed to take care of the confusion caused; and, of course, the telephone company, in order to cover this expense, along with other added expenses, would apply for higher rates, and subscribers would have to pay higher rates.

I understand that this is only a drop in the bucket, but drop upon drop fills a bucket; so it is here that all these things accumulate, and it puts the burden on the public, and the telephone has become such a useful instrument that it ceases—it has long ceased to be just a matter for the convenience of a few. Everybody uses it more or less, sooner or later.

Now there is no explanation offered by the defendants, and, not having sufficient interest to have given an explanation in court, I think it is proper to issue a preliminary injunction."

No subsequent action was taken by the defendants, so the order was made perpetual on December 28, 1931.

Commission Questions Accounting Method in Charity Gifts.

Nearly a quarter-million dollars were donated by the New York Telephone Co. to charities and charged to operating expenses during the last three years, it was disclosed on February 17 at a hearing by the New York Public Service Commission on the question of the propriety of this practice.

The company's figures showed that gifts to charities had increased from $16,773.18 in 1929 to $86,937.39 in 1930 and $129,703.38 during 1931, a total for the three years of $233,413.95. The greater part of last year's total, $80,060, was given for unemployment relief.

The hearing was held in New York City before Milo R. Maltbie, chairman of the commission. Chairman Maltbie contended that the charity donations should be charged by the company to its surplus account and pointed out that a vital principle was involved in the practice of ascribing such gifts to operating expenses.

Counsel for the company declared that its present system followed its interpretation of the Interstate Commerce Commission's accounting practices and that it saw "no valid reason for changing a habit of many years."

The figures showing the company's charity donations were put into evidence as follows:

	1929.	1930.	1931.
Chambers of commerce ...$	995.00	$7,359.75	$10,864.50
Unemployment relief	.....	50,913.00	80,060.00
American Red Cross	27.00	56.00	16,406.00
Community welfare funds...	5,210.00	7,772.00	10,310.00
Hospitals	3,046.00	2,756.00	1,775.00
Miscellaneous charities	2,171.00	3,099.50	3,622.00
Other miscellaneous	5,324.18	14,981.14*	6,665.88
Total .....$	16,773.18	$86,937.39	$129,703.38

*Includes contribution of $10,000 to Museum of City of New York.

So far as the telephone company is concerned, its assistant general auditor, Benjamin Franklin Young, explained, it makes very little difference whether these donations are charged to surplus or operating expenses. He pointed out that the donations constituted a very small part of total operating expenses, about 87-1000 of 1 per cent. Total operating expenses for 1931, during which the company made gifts of $129,703, were $149,111,001, Mr. Young said. At the end of 1931 the company had an approximate aggregate surplus of about $60,000,000.

Edward W. Beattie, attorney for the company, expressing willingness to cooperate with the commission, added that "there is no attempt on our part to conceal or evade or to flout your authority, but we do not feel that we should try to keep two sets of accounts and serve two masters."

Mr. Maltbie emphasized that the propriety of the company's "laudable" gifts was not questioned in the least, but that the method of charging them deserved close investigation because the practice "might set a precedent for some not so laudable purpose."

M. M. Fertig, assistant corporation counsel, represented the city at the hearing. The commission reserved decision.

Summary of Commission Rulings and Schedule of Hearings.

ILLINOIS.

February 8: DeKalb-Ogle Telephone Co., of Sycamore, authorized to issue and sell $164,450 aggregrate par amount of its common capital stock, consisting of 16,445 shares of par value of $10 a share, to reimburse its treasury for expenditures for construction, extension and improvement of its facilities.

February 24: Hearing in Chicago before Commissioner Samuell on citation of the Illinois Commerce Commission on its own motion against the Middle States Telephone Co. to show cause why there should not be a reduction in rates for telephone service in the cities of Pekin, Park Ridge, DesPlaines and vicinities.

INDIANA.

February 6: A motion of the Northern Indiana Telephone Co. to dismiss a petition to restore free service between exchanges of the Lagro and Andrews telephone companies was granted.

KANSAS.

February 29: Hearing in Kirwin on complaint of the subscribers of the Kirwin Telephone Co. against the United Telephone Co.

March 1: Hearing on complaint of the telephone subscribers at Oberlin against the United Telephone Co.

March 18: Hearing on complaint of subscribers at Greensburg against the Southwest Telephone Co. of Pratt.

MISSOURI.

February 18: In regard to complaint of the commission vs. the Goodman Telephone Co. Mr. and Mrs. N. O. Hornsby were authorized to purchase the Goodman exchange.

OHIO.

February 10: Village officials of Huron filed protest against rates charged by the Huron Telephone Co. A similar petition to the commission last year was dismissed when the company agreed to revise rates established in 1929, the officials said. This has not been done, they assert.

OKLAHOMA.

March 14: Hearing in Oklahoma City of testimony concerning charges for hand set telephones. The case comes up on a complaint from Shawnee. It is expected the commission will make a general ruling covering this type of service.

WISCONSIN.

February 18: Hearing held at Madison on the application of the Chippewa County Telephone Co. to validate, revise and reduce its telephone rate. The company operates exchanges at Jim Falls, Eagle Point and Holcombe.

Business Responds to the Hand of Experience--Consult With Us

▼ ▼ ▼

Write the Public Utilities Department

The United Trust Company

ABILENE, KAN.

Specialists, with a background of more than 30 years in telephone operation.

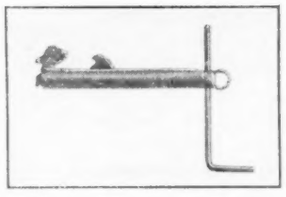
Publicity—Advertising—Financing—Appraisals—Accounting, etc.

COFFING HOISTS

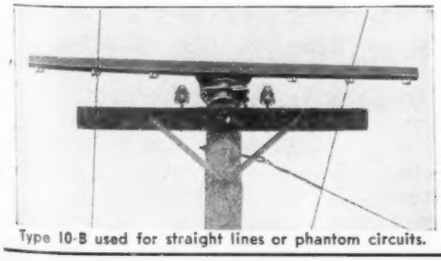
"THE UNIVERSAL TOOLS"

are being used by Telephone and Power and Light Companies in construction and maintenance work, changing insulators on tower lines, for pulling guys, messengers, underground cables, laying water and gas mains, or wherever a lift or pull is needed. Can be used in any position. Sizes from ¾ to 6 ton, wt. from 14 to 65 lbs. Model A ¾ ton. Model F 1½ ton.

Flag, flag holders, and electric light for poles, pipes, etc., in transit day or night. Can be easily attached or removed. Spring attached to chain so holder will not work loose.



Temporary Guy Clamp. For necking guy wires under heavy tension. 3 bolt clamp can be put in proper location without using hammer.

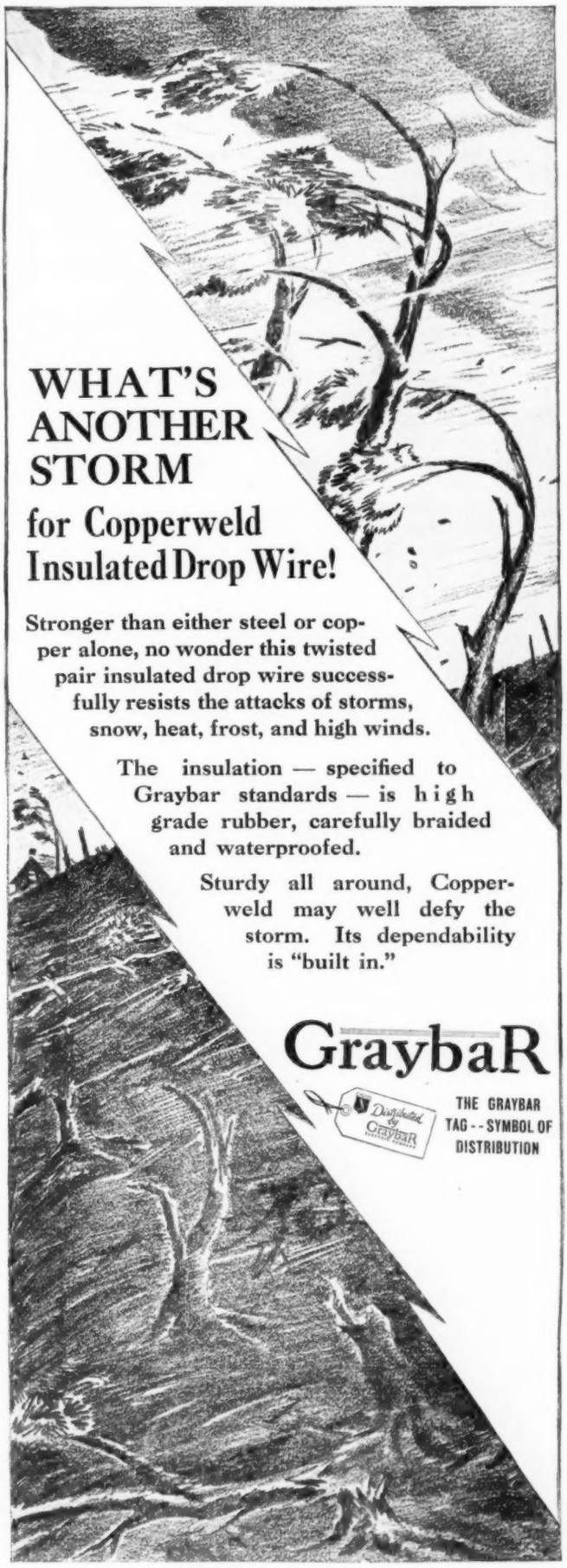


Type 10-B used for straight lines or phantom circuits.

COFFING TEMPORARY CROSSARM AND CLAMP

They can be readily clamped to a pole above or between the crossarms. For changing crossarms on corners or on pole lines.

COFFING HOIST CO. 313 East Vanburen St. DANVILLE, ILLINOIS



WHAT'S ANOTHER STORM for Copperweld Insulated Drop Wire!

Stronger than either steel or copper alone, no wonder this twisted pair insulated drop wire successfully resists the attacks of storms, snow, heat, frost, and high winds.

The insulation — specified to Graybar standards — is high grade rubber, carefully braided and waterproofed.

Sturdy all around, Copperweld may well defy the storm. Its dependability is "built in."

GraybaR

Distributed by GraybaR

THE GRAYBAR TAG--SYMBOL OF DISTRIBUTION

With the Manufacturers and Jobbers

New American Electric Equipment to Be Installed at Prescott, Ark.

The Mid-West States Utilities Co. has placed an order with the American Electric Co. of Chicago for complete new central office equipment for Prescott, Ark.

The initial installation will include a Monotype senior common battery multiple switchboard consisting of three unit operators' positions and an overhanging multiple. The number of local lines to be installed is 560 and the rural and toll lines will number 50.

The line equipments are to be of the common battery, associated-lamp-multiple type arranged on a four-panel multiple basis. A total of 51 full universal cord circuit equipments, providing two-party selective ringing and automatic ringing on common battery lines, is to be installed.

At the present time, the outside plant in Prescott is being rebuilt and many of the telephones are being replaced with new instruments. While no definite date has been selected for the cut-over, it is expected that the new equipment will be installed some time this spring.

FWD Plant Starts Year Using Three Full Shifts.

"We finished the year 1931 and are entering the year 1932," states W. A. Olsen, president and general manager of the Four Wheel Drive Auto Co., Clintonville, Wis., "with the largest volume of commercial orders on our books in the history of the company, necessitating the operation of all the machine departments of the company 24 hours a day.

"This is represented by three eight-hour shifts and running full 5½ days a week; by operating all the assembling departments and transportation departments eight hours a day with full crews 5½ days a week; with all administration forces operating nine hours a day for full weeks and with a service department operating all hours of all days throughout the entire week.

Our survey of our markets indicates that we will be busier in 1932 than we were in 1931, for FWD trucks are constantly assuming greater responsibility in building roads; keeping them open both summer and winter, and in the transportation of the more important industries throughout the civilized world."

The FWD company has increased its selling and advertising program for this year and will continue its policy of concentrating on natural FWD markets. This policy has enabled the FWD company to work closely with prospects and users and render them intelligent service with their trucking problems. This year three new markets, in which FWD trucks can render a distinct service, have been added to the list.

New models have been developed, which will shortly be announced. One is a front drive truck and the other is a model which has been completely designed for appearance. "The FWD truck, to reverse an old saying," says E. K. Bard, FWD artist-engineer, "is now ornamental as well as useful."

Purchases Switchboard for Alta Vista, Va., Exchange.

The Southeast Public Service Co. of Charlottesville, Va., recently purchased a 6-800 masterbuilt switchboard from the Kellogg Switchboard & Supply Co., for installation in its Alta Vista, Va., exchange. This is the second masterbuilt switchboard recently purchased by the company. The first board was installed in its Elkin, N. C., exchange.

The Southeastern Public Service Co., under the direction of L. D. Densmore, is rapidly improving its Virginia properties with complete reconstruction and new equipment where necessary. This general policy of improvement is meeting with hearty approval from the public. It is said to be largely responsible for the company's excellent public relations and large subscriber list in the face of nation-wide difficulties.

Each improvement project is carefully laid out from an engineering, operation and investment standpoint and only high grade material and workmanship are used.

The new equipment for Alta Vista consists of a one-position 6-800 masterbuilt switchboard, wired and equipped for 100 common battery local lines, ten toll lines and ten rural lines. The board is also equipped with 20 combined drops and jacks. The masterbuilt switchboard assures Alta Vista subscribers of a fine type of service. Because of its flexibility this equipment will permit economical growth. Should changes in toll or rural positions be necessary, they can be made overnight without service interruptions. Mr. Densmore plans to have the new board cut into service early this year.

BOOK REVIEW.

ELECTRICITY; WHAT IT IS AND HOW IT ACTS, VOLUME II, by Andrew W. Kramer. Published by Technical Publishing Co., Chicago. 290 pages. 8 ins. by 5½ ins. with 112 diagrams and illustrations. Price $2.00.

This volume is a continuation of Electricity—What It Is and How It Acts, Volume 1, which was devoted, primarily, to a discussion of electrical phenomena not involving electromagnetic radiation of energy. Here, this discussion is extended to include radiation phenomena of various kinds.

The two volumes cover, in simple language, all that is known about electricity today. They explain what it is, how it produces various effects we are familiar with, what magnetism is, how light waves and X-rays are produced, what radio-activity is.

It is not fanciful; it deals only with known and accepted theories, presenting them simply and straightforwardly so that those not mathematically minded can understand them. It is this unusual treatment of a scientific subject that is claimed to have won the favor of both the technical engineer and the layman.

The book is entirely of a fundamental nature; but by the use of many analogies, the author has presented otherwise incomprehensible phenomena in a way that can be visualized by a non-mathematical mind.

The underlying principles of radio, and the subjects of X-rays, radio-activity magnetism, and crystal analysis—all covered in volume II—are in each case discussed from the most fundamental viewpoint. The book reads more like fiction than like a text-book and its many illustrations and diagrams add to its clearness.

For the telephone plant man, laboratory worker, or engineer who would like to broaden his general undersanding of the field of electricity without the usual necessary deep study, this book should be especially appealing.

Supply Manager of Stromberg-Carlson Telephone Mfg. Co.

F. J. Courneen, formerly of the purchasing department of the Stromberg-Carlson Telephone Mfg. Co., Rochester, N. Y., has been appointed supply manager, George A. Scoville, vice-president and sales manager, has announced.

Mr. Courneen, who has been associated with Stromberg-Carlson since 1917, will devote all his time in serving telephone operating companies in regard to construction materials.

Prices in the Metal Markets.

New York, Feb. 23.—Copper—Quiet; electrolytic spot and future, 6¼c. Tin—Steady; spot and nearby, $22.30; future, $22.55. Iron—Quiet; No. 2 f. o. b. eastern Pennsylvania, $14.50@15.00; Buffalo, 14.50; Alabama, $10.00@11.00. Lead—Steady; spot New York, 3.75c; East St. Louis, 3.55c. Zinc—Steady; East St. Louis spot and future, 2.82@2.85c. Antimony—6.75c. Quicksilver—$66.00@69.00.

Theory and Use of Electrical Testing Instruments; Power and Frequency Meters.

Indicating Wattmeters.

A wattmeter is an instrument for indicating the instantaneous value of the power in an electrical circuit. It consists essentially of two coils arranged as shown in Fig. 1. Coil *A* is wound with heavy wire through which the current flows to the load; therefore, the strength of the field produced by this coil is directly proportional to the current passing.

Coil *B* is wound with a larger number of turns of fine wire and is connected across the circuit so that the strength of its field is proportional to the potential difference of the circuit. These two coils are so connected that the resulting field, when they are connected in a circuit, causes the indicator to move over a calibrated scale.

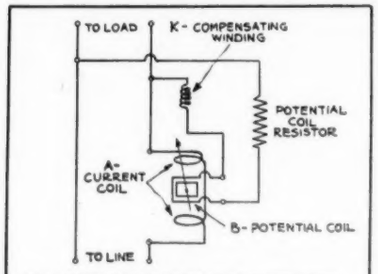


FIG. 1. CIRCUIT OF AN INDICATING WATTMETER.

The tendency of the moving coil to turn is directly proportional to the product of the current flowing through coil *A* and the potential difference across coil *B*. Therefore, the scale may be calibrated in watts; that is $P = IE$. It will be noted that a separate coil, *K*, is connected in series with the moving coil, *B*. The purpose of this winding is to compensate for the current taken by the potential coil. This is accomplished by poling this coil so that its field partially counteracts that of the series coil.

Most wattmeters are suitable for use on either alternating or direct current as no permanent magnets are used. While the power taken by any electrical appliance or load can be approximately determined by means of a voltmeter and ammeter, a wattmeter is required to show the true power consumed. Hence it is preferable in measuring power load.

A wattmeter will read true watts inasmuch as the deflection of the moving coil of the wattmeter is dependent on the instantaneous magnitude of voltage and current. Hence if the current is lagging behind the voltage or leading the voltage, the torque is proportionally less than it would be if they were in phase at that particular instance.

A voltmeter and an ammeter, however, show effective volts and effective amperes, respectively, and do not take into account the phase angle between voltage and current. Wattmeters are useful mainly in connection with measurements of power appliances and apparatus.

Watt-Hour Meters.

A modified form of the indicating wattmeter is used for recording the amount of power consumed by equipment and appliances. Such a meter is known as a watt-hour or kilowatt-hour meter. In the direct current type of watt-hour meter, a motor armature and commutator are used in place of the moving coil used in the indicating type of wattmeter. Its armature turns in the same manner as the armature on motor.

To prevent a weak current from rotating the armature as fast as a stronger current, some form of artificial load must be provided. This is arranged for by attaching to the armature shaft an aluminum disk which is rotated between the poles of two permanent magnets in such a way that eddy currents are induced in the disk. The field set up by these currents interacts with that of the permanent magnet thus slowing down the motor armature.

The reaction is directly proportional to the speed of the rotating disk; hence, if the increase in driving torque is proportional to the power supplied to the instrument, the speed of the armature will always be in direct proportion

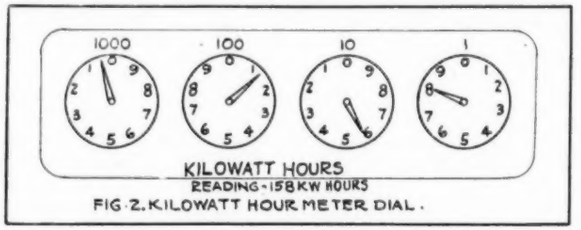


FIG. 2. KILOWATT HOUR METER DIAL.

to the power, thus registering the power in watts directly on the dial. The armature shaft connects by means of a worm gear to a clock which automatically records the number of kilowatt hours consumed. A dial is shown in Fig. 2.

Alternating current recording watt-hour meters operate in a somewhat similar manner to direct current meters, utilizing a potential and current coil. However, the motor mechanism operates the same as a single phase induction type meter.

In reading a watt-hour meter, the dials should be read from right to left. Referring to Fig. 2 the first dial on the right reads 8, the next dial reading is 5 and the next is 1 and the last one 0. Therefore, the instrument reading would be 158 kilowatt hours.

When any one of the indicator hands is close to a number and it is difficult to distinguish what the correct reading should be, it can always be determined by referring to the dial immediately to the right of the dial in question. The reason for this is apparent when it is considered that the

hands are initally all set at 0; hence each dial must make one complete revolution for a one division change in the dial to the left.

Frequency Meters.

There are three frequency meters in use in connection with power and communication work. These are: The resonance or vibrating reed type, the escapement type, and the induction type. The resonance or vibrating reed type frequency meter is dependent upon a number of tuned reeds of different lengths mounted in a row. All these reeds are simultaneously subjected to electromagnetic impulses from an electromagnet connected to the source, the frequency of which is to be measured.

The reed which has a natural frequency similar to that of the alternating current source under measurement will vibrate while others will remain practically still. The reeds are so arranged in front of a window that the vibration of

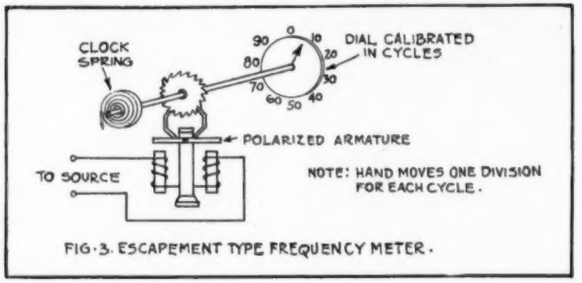


FIG. 3. ESCAPEMENT TYPE FREQUENCY METER.

the free end shows up above a calibrated scale. This type meter is used to some extent in power boards and in checking the frequencies of harmonic converters or ringing machines used in telephone work.

The escapement type frequency meter, shown in Fig. 3, utilizes a flat clock-work mechanism together with an electromagnetically operated escapement. The armature of the electromagnet is so arranged that for each alternation the clock mechanism is allowed to advance one step thereby moving an indicator needle over a uniformly divided scale.

With this type of frequency meter it is necessary to make a one-minute test to determine the number of alternations per minute and then divide by 60 the frequency in cycles per second.

It is suitable for use only on the lower frequencies ranging from 1 to 70 cycles per second. It has the advantage of being both simple and quite highly accurate, the accuracy depending upon the length of time over which observations are made.

News Facts Education Assistance

THERE are suggestions for improvements — problems solved —ideas for increasing revenue—all capably and interestingly written in every issue of TELEPHONY.

TELEPHONY covers all branches of the business, presenting information of value regarding management, operation, construction, engineering, commercial, traffic, maintenance, financing, manufacturing, commission orders, rate cases—in fact all phases of the industry.

In the past few years there have been many new developments in operating methods, and organizations, to say nothing of technical developments. All these have been faithfully and accurately described in TELEPHONY. Technical developments are presented in a simple, understandable way.

The up-to-date telephone man reads TELEPHONY because it gives him the important developments in his business promptly—every week.

Every telephone man should receive his personal copy of TELEPHONY.

Telephony

608 S. Dearborn St. Chicago

Telephone Wabash 8604

MANUFACTURERS' LITERATURE

The following is a brief description of recently published bulletins, catalogs, etc. If you are interested in obtaining copies address your request to the manufacturer.

Notices Previously Published

CLIMBERS

16-page booklet illustrating and describing climbers, straps, pads, tool belts and safety straps for linemen. **W. H. Buckingham, 503 State Street, Binghamton, N. Y.**

CONVERSION KIT

Bulletin No. 203 describes how surplus idle wall telephones accumulating in the stockroom, can be converted to modern, attractive wall Masterphones. Complete simple instructions for this change are included in the bulletin, together with illustrations showing details of construction. **Kellogg Switchboard & Supply Co., 1066 West Adams Street, Chicago, Ill.**

NEW BUSINESS CAMPAIGN

32-page loose-leaf book, outlining a complete advertising campaign to help telephone companies sell new customers and keep old customers sold. For large and small exchanges newspaper advertisements, post cards, folders, and other direct mail pieces are shown. **Kellogg Switchboard & Supply Co., 1066 West Adams Street, Chicago, Ill.**

OUTDOOR TELEPHONES

Bulletin No. 212 contains complete description and specifications of the new Kellogg outdoor telephone. **Kellogg Switchboard & Supply Co., 1066 West Adams Street, Chicago, Ill.**

1-A POWER UNIT

New bulletin No. 176 giving complete description of the No. 1-A Power Unit. This unit with a set of storage batteries, forms a complete power installation, for P.B.X., magneto, or small common battery switchboards. It is an ideal arrangement for an office handling 3,000 calls or less a day. **Kellogg Switchboard & Supply Co., 1066 West Adams Street, Chicago, Ill.**

POLES

A 16-page illustrated booklet entitled, "Termites—A Growing Menace to Untreated Timber." Ayer & Lord Tie Company, Railway Exchange Bldg., Chicago, Ill.

POLES

"Handbook of Practical Information About Cedar Poles and Butt-treating," is the title of a 40-page, illustrated book now available. **Page & Hill Company, Minneapolis, Minn.**

SALES CAMPAIGNS

Two Small Folders specially designed for extension sales campaigns are now available. They will be furnished complimentary all ready for insertion with your monthly bills—they can be obtained in any quantity required. American Electric Company, Incorporated, State & 64th Streets, Chicago, Illinois.

TRANSMITTER BATTERY POWER UNIT

New bulletin TC-39 describing the new type CAB-4 combination storage battery and trickle charger power unit for magneto operator's transmitter battery, and its use. **Fansteel Products Company, Inc., North Chicago, Illinois.**

WOOD PRESERVATIVE

An eight-page booklet entitled, "ZMA for Wood Preserving," regarding the different uses of ZMA wood preservative. Curtin-Howe Corporation, 405 Lexington Ave., New York City, N. Y.

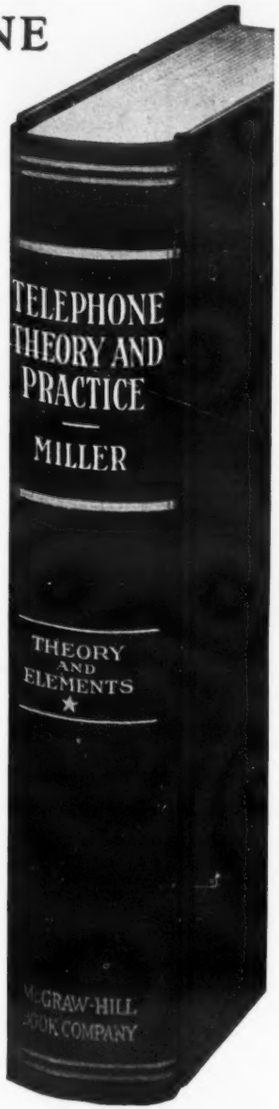
When writing please mention TELEPHONY

TELEPHONE THEORY and PRACTICE

Theory and Elements

by **Kempster B. Miller**

Fellow, American Institute of Electrical Engineers; Member, Western Society of Engineers; Author of American Telephone Practice, 1904, and Joint Author of Telephony, 1912.



Here is a book that comprehensively covers those introductory and theoretical elements of telephony needed for study and reference by workers in all stages of the profession. It is written by an authority; a man connected with practical telephony for more than thirty-five years. Although the first volume of a three-volume series, this book, Theory and Elements, represents an independent, complete and up-to-date treatment of its subject. A thorough groundwork in the background and principles of telephony is given, which will serve:

1. **The rank-and-file telephone worker as a preparation for an understanding of the practical phases of his job.**
2. **The more advanced telephone worker who is specializing in some particular phase of the industry and who may wish to see more clearly how his job is related to the rest of the business.**
3. **The general technical reader who is interested in the broad phases and general workings of the industry.**
4. **The college student who is interested in underlying theory.**

Throughout, the book is written in understandable language, with mathematical applications reduced to a negligible minimum. We recommend this book of great interest and value to every telephone man. 492 pages, 6x9; 272 illustrations; $5.00.

Telephony Publishing Corporation

Telephone Wabash 8604

608 South Dearborn Street Chicago

Condensed Telephone News

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items Relating to Construction, Rebuilding, or Changes in Their Plants and Systems

Franchises.

JEFFERSON, IOWA.—At a special election held here on February 11 the Northwestern Bell Telephone Co. was granted a franchise by a vote of 486 to 318. It is stated that the telephone company paid for the special election which ends a controversy between the company and the city council.

The council had ordered poles and wires removed from the street but the telephone company declared it was operating under an earlier franchise.

Construction.

ERIE, PA.—The Pennsylvania Telephone Corp. will spend $750,000 in the rehabilitation and expansion of its properties in Pennsylvania, and most of it in the northwestern part of the state, according to a recent announcement. The expansion work will continue throughout the summer.

Work planned includes the placing of more than 4,000 poles, 164,000 feet of cable, ranging in size from 50 to 600 pairs, switchboards, station and other equipment, which will provide work for a large crew of men for several months.

The corporation recently completed large underground cable extensions in the Oil City and Johnstown districts for expansion of service and relief of service in congested areas.

Elections.

BELMONT, ONT., CAN.—The Belmont Telephone Cooperative Association, Ltd., has elected: President, Skene Smith; vice-president, John Ferguson; directors, S.

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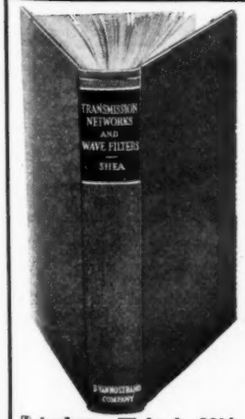

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By
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Member of the Technical Staff, Bell Telephone Laboratories
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Smith, J. Ferguson, J. S. Cousins, J. A. Moore and William Campbell; secretary-treasurer, Mrs. E. E. George; manager, F. J. Yorke; auditors, W. C. Barons and Andrew Dodds.

BLYTH, ONT., CAN.—At the recent annual election of the Blyth Rural Telephone System these commissioners were elected: G. M. Chambers (chairman), John Fingland and James Tiernay; secretary-treasurer, Miss Gladys Fawcett. A move to purchase new quarters was defeated by a vote of 191 to 81.

GANANOQUE, ONT., CAN.—Officers of the South Leeds & Pittsburg Rural Telephone Co. are: President, David Dempsters; vice-president and secretary, W. L. Sliter; treasurer, John Bell; directors, A. D. McCalpin, Colin Gray, A. J. Waldie and W. J. Webb; auditors, F. W. Dempster and S. F. Ferguson.

LELAND, IOWA.—At the annual meeting of the Leland Mutual Telephone Co. officers were reelected: T. T. Carlson, president; O. H. K. Eidahl, vice-president; O. Michaelson, secretary-treasurer; Eddie Ambroson, director; F. W. Bowman, lineman.

BLADEN, NEB.—The following officers of the Glenwood Telephone Co. were reelected at the annual meeting: President, Oley Iverson; secretary, D. S. Phelps, and treasurer, J. L. Ashmore. A 25 per cent cut in the salaries of offices and linemen was ordered, as well as a reduction in rates of $1.00 for each six months' period, where payment was made in advance during the first month.

LIBERTY, NEB.—At the annual meeting of the Liberty Independent Telephone Co., Leno Doty was named president and C. L. Shaffer, vice-president to fill vacancies.

OTTAWA, OHIO.—Officers and directors elected at the annual stockholders' meeting of the Putnam County Telephone Co. are: Ward H. Snook, Columbus, president; R. P. Means, Leipsic, vice-president and general manager; R. L. White, Toledo, secretary-treasurer; Lois M. Stough, assistant secretary-treasurer; and George Martin, Columbus, director.

MENNO, S. D.—The Menno Telephone Exchange held its annual election of board of directors which resulted in the following being named: H. A. Schnaidt, William Rames, Chris Handel, Emil Goehring, Ted Handel, Gilbert Larson, Jacob Handel, Jacob Redman, and Emanuel Herrboldt. They organized by electing Gilbert Larson, president; H. A. Schnaidt, vice-president and Joe Ulmer, secretary.

COOKEVILLE, TENN.—Officers of the Mutual Home Telephone Co. elected at a recent meeting are: J. M. Dowell, president; Howard Draper, vice-president; E. H. Buck, treasurer; B. C. Huddleston, secretary; W. H. Barr, general manager; and Sid Phillips, local manager.

TREZEVANT, TENN.—At the annual stockholders' meeting of the Trezevant Telephone Co. officers were elected as follows: J. L. Cochran, president; R. L. Bryant, vice-president; A. A. Argo, secretary-treasurer; M. F. Hurdle, manager. In addition to the four foregoing the following will compose the board of directors: W. H. Hames, J. E. Bryant, E. T. Baker, W. F. Smith, A. R. Bryant and A. J. Argo.

BLACK EARTH, WIS.—At the annual meeting of the Black Earth Telephone Co., Howard Sebert was reelected president; Herman Hacker, vice-president; Mrs. Clara Kahl, secretary; Newell Parker, treasurer. Directors are Otto Schlick, Ferdinand Koch and George Gulson.

NELSON, WIS.—At the recent annual meeting of the Nelson Telephone Co., E. G. Johnson was elected president; C. E. Jacobson, vice-president; P. M. Jacobson, secretary; H. C. Jacobson, treasurer; and H. L. Place, director.

WISCONSIN RAPIDS, WIS.—Officers of the Wood County Telephone Co. were recently reelected as follows:

Guy O. Babcock, president; A. U. Marvin, Nekoosa, vice-president; E. B. Smart, secretary, and F. W. Kruger, treasurer. Other directors in addition to the officers are Frank W. Calkins and W. T. Nobles.

Miscellaneous.

BRADFORD, ILL.—E. Yoemans, of Stronghurst, has been made manager of the exchanges at Bradford, Buda, Camp Grove and Edelstein of the Illinois Commercial Telephone Co.

EVANSTON, ILL.—An ordinance has been passed by the city council providing stiff penalties under the city code for persons attempting to obtain telephone service without paying for it and also for attempting to extract or extracting coins from a telephone coin box through illegal means.

MARION, ILL.—D. B. Crouse has been made manager of the Marion district of the Illinois Commercial Telephone Co., with 15 exchanges under his management.

The company has reorganized into 17 districts, where there had been but five. Mr. Crouse had formerly had charge of the Marion group of exchanges, which included Marion, Creal Springs and Johnston City. In addition to these the following exchanges are in his district: Benton group, including Ewing and Thompsonville; Christopher group, including Christopher, Sesser and Zeigler; Herrin group, including Herrin, Cambria, Hurst and Royalton, and West Frankfort.

OWENSVILLE, IND.—A suit has been filed in circuit court at Princeton by Forman E. Knowles, receiver of the Owensville State Bank, seeking judgment for nearly $6,000 against the Owensville Telephone Co. and the appointment of a receiver. The company has about 475 subscribers.

FREDERICKTOWN, MO.—The Citizens Telephone Co. has been sold to the Southeast Missouri Telephone Co. for the sum of $37,500. The purchase price includes all their property and contracts.

The Citizens company was bought in March, 1930, by E. O. Turner, who came to Fredericktown from Centralia, Mo. Prior to this the telephone system was owned by Fredericktown citizens with E. D. Anthony as manager.

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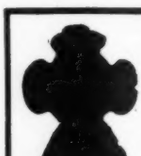

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